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Clearinghouse-Five: determinants of voluntary clearing in European derivatives markets

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Abstract

In the European Union, there is obligation to centrally clear certain credit and interest rate derivative contracts, while other trades can be voluntarily cleared through a central counterparty if the parties to the contract wish to clear it thus. I use a dataset of all newly entered into derivatives contracts in the European Union between March 2016 and June 2017 to show the extent to which central clearing is being used for derivatives belonging to all five major asset classes, and to determine which characteristics of the contracts not under the clearing obligation affect the likelihood they would be centrally cleared on a voluntary basis. I show that currently only around 20% of credit and 40% of interest rate derivatives are centrally cleared, while equity, foreign exchange, and commodity derivatives are barely centrally cleared. I also show that there are significant effects of scale connected with central clearing, both in terms of previous clearing activity of the counterparty and the notional of the specific contract. Finally, I show that various characteristics of the contract, such as the maturity and the type of counterparty involved, also have significant impact on the probability of a trade being centrally cleared, but these effects tend to be ambiguous and depend on the specific combination of factors.

JEL classification: C58, G28, G32.

Keywords: derivatives, central counterparties, clearing, EMIR data.

1. Introduction

I use an extensive dataset of new derivative contracts across all five broad asset classes (commodity, credit, equity, foreign exchange, interest rate) in the European Union entered into between March 2016 and June 2017 to estimate the impact of various characteristics of such contracts and the counterparties to these contracts on the willingness of these counterparties to clear their contracts through a central counterparty on a voluntary basis. I also use the same dataset to provide a general overview of the rate at which derivative contracts in the European Union are centrally cleared, be it due to the legal obligation or voluntarily.

Central clearing for all standardised over-the-counter derivatives is one of the main elements of the ongoing reform of the financial system following the Great Financial Crisis. A central counterparty (CCP) steps into bilateral trades through novation, and becomes the buyer to every seller, and the seller to every buyer. By taking on and subsequently managing counterparty credit risk appropriately, CCPs help their clearing members insure against default losses stemming from their derivative exposures. To achieve this, CCPs collect collateral in the form of initial and variation margins, and perform other risk-management procedures. Entities which are not clearing members to a CCP can still clear their contracts as clients of the clearing members.

The obligation to centrally clear certain derivative contracts has been introduced in the European Union with the European Market Infrastructure Regulation (EMIR). Article 4 of EMIR states that counterparties shall clear all OTC derivative contracts if:

1. they pertain to a class of OTC derivatives that has been declared subject to the clearing obligation;
2. they have been concluded between financial counterparties or other counterparties trading above the clearing threshold;
3. they are entered into or novated after the date the clearing obligation takes effect or after notification of the clearing obligation but before the date from which the clearing obligation takes effect if the contracts have a remaining maturity higher than the minimum remaining maturity.

OTC derivative contracts that are intragroup transactions shall not be subject to the clearing obligation.

Currently only certain index credit default swaps and interest rate derivatives are subject to obligatory clearing in the European Union. Counterparties have been divided into four categories (1: clearing members; 2: large financial counterparties and funds; 3: small financial counterparties and funds, 4: non-financial counterparties) and the clearing obligation across these categories has been phased-in over several years. The clearing threshold for non-financial counterparties has been set at 1 billion euros for credit and equity derivatives and 3 billion euros for interest rate, foreign exchange, and commodity derivatives. Counterparties can clear their contracts centrally on a voluntary basis even if a legal obligation is not in force for a given contract.

The impact of regulatory reform of the derivatives markets on financial stability is a key concern for policy makers. The general consensus is that proliferation of central clearing has a positive effect on financial stability. There are unanswered questions of the incentives around central clearing of various economic agents, the calibration of the regulatory regime for derivative exposures, and the extent to which central clearing may be extended to help safeguarding financial stability without having an adverse effect on the derivatives markets and the ability of firms to hedge their exposures effectively. This study helps to answer some of these questions, as it provides a broad overview of the clearing landscape in the European Union and some insights into the incentives of counterparties to clear their derivative contracts.

I use a comprehensive dataset of all new derivative contracts from one of the trade repositories gathering such data under EMIR, which covers a vast majority of all over-the-counter (OTC) derivative contracts that have been entered into between March 2016 and June 2017 in the European Union. The dataset does not contain exchange traded derivative contracts, as such the results in this study can be interpreted as pertaining to OTC derivatives specifically. Thus, further in the paper derivatives refers to OTC derivatives, unless specified otherwise. The dataset covers various characteristics of the contracts, including whether they are under clearing obligation and whether they have been centrally cleared, as well as information about the parties to the contracts. The final clean sample used to study the determinants of voluntary clearing of derivatives has around 85 million of trades, which makes it the largest sample used in a study of European derivatives markets to date.

Overall, I show that only credit and interest rate derivative contracts are centrally cleared to a significant degree. There is a number of reasons for this. First, clearing obligation is in force only for these two asset classes. Second, there is an initial sunk cost to moving from bilateral trading to centrally cleared world, which many counterparties are not willing to bear without a legal obligation to do so, even if central clearing is beneficial for both financial stability and market transparency. Third, as I also show in this study, there are significant effects of scale to central clearing, thus it is not as beneficial to clear derivative contracts in asset classes with very little prior central clearing as various benefits to central clearing (e.g. netting benefits) are not fully realised in this case. This result hints at the necessity of a legal obligation to kickstart central clearing within commodity, equity, and foreign exchange derivatives markets.

I study a variety of hypotheses related to the incentives of counterparties to clear their derivative contracts in the absence of a legal obligation. In particular I check whether various characteristics of the contract (such as the maturity and the notional value) and of the counterparties (both being a part of single group, at least one being located outside of the European Economic Area or being a financial entity, the notional traded or cleared in the previous month by the reporting counterparty) have an effect on the likelihood of a contract not under a clearing obligation to be centrally cleared on a voluntary basis.

I show that there are no incentives to centrally clear intragroup derivative contracts, in line with the expectations. I also show that contracts with higher notional values are more likely to be centrally cleared. The same is the case for trades with counterparties who have cleared more within the same asset class in the previous month. The effect of maturity of the contract on the likelihood of it being centrally cleared depends on the asset class in question. The same is the case for the involvement of a non-EEA entity or a financial entity as a party to the contract.

In sum, the analysis contained in this paper hints at strong effects of scale in central clearing on several levels, including with regards to the notional of the contract, and the notional previously cleared by the counterparties. The analysis also shows that other characteristics of the contracts can have various effects on the likelihood of a contract being centrally cleared depending on the asset class and the specific configuration of factors. Thus, care must be taken when making modelling assumptions for the whole of derivative exposures of economic agents and when discussing the calibration of the clearing obligation in the European Union.

The remainder of the paper is structured as follows. The relevant literature is briefly discussed in Section 2. The data used and the cleaning procedure are then described in Section 3. The clearing rates of derivatives in the European Union are presented in Section 4, and the determinants of voluntary clearing of derivative contracts are then described in Section 5. Finally, Section 6 concludes. Several tables are relegated to Appendix A.

2. Literature review

The purpose of this review of literature is not to provide a detailed overview of the general literature on derivative contracts and central clearing, but rather to serve two specific purposes. First, I review relevant literature on central clearing to theoretically substantiate the hypotheses tested in this paper and provide background to them. Second, I review other papers discussing determinants of central clearing of derivative contracts to present where this analysis fits in.

Given the mandate for the wide use of central clearing given by the G20 leaders after the Great Financial Crisis, the body of literature on this topic has been growing steadily within the last decade. In theoretical literature, Duffie and Zhu (2011) show that the introduction of clearing for a single asset class could increase collateral demand and counterparty exposures, Cont and Kokholm (2014) show that with multiple asset classes central clearing can reduce interdealer exposures, and multiple authors show that central clearing limits the excess risk-taking (Acharya and Bisin, 2014; Biais, Heider, and Hoerova, 2016; Koeppl, Monnet, and Temzelides, 2012). Pieces of particular relevance to this study are discussed in detail below.

Ghamami and Glasserman (2017) gauge whether the higher capital and margin requirements adopted for bilateral contracts create an incentive in favour of central clearing. Thus, it is complementary to the study undertaken in this paper, as I gauge incentives for central clearing other than capital and margin requirements, albeit these may be captured indirectly in my empirical setup. The authors calibrate their model with data from the United States and find that the main factors driving the cost comparison between bilateral and centrally cleared contracts are the netting benefits achieved through bilateral and central clearing, the margin period of risk used to set initial margin and capital requirements, and the level of central counterparty (CCP) guarantee fund requirements. They show that such comparison does not necessarily favour central clearing. They also make a few remarks useful from the perspective of this study. They note that despite the clearing mandate for certain derivatives, as it involves the criterion of the contract being sufficiently standard to require central clearing, the actual decision to clear retains discretion of the counterparties as they can customise these rather easily if they should like to trade them bilaterally. This underlines the importance of empirical work on the determinants of which trades are actually voluntarily cleared to both inform the theoretical work and help regulators align the incentives around the clearing mandate appropriately. They also note that a CCP should be better prepared than the bilateral market to deal with the failure of a major derivatives market participant. This could mean that major derivatives market participants are more likely to clear their trades, being forced to do so by other participants to increase their creditworthiness. I attempt to investigate such possibility in this paper.

Duffie, Scheicher, and Vuillemey (2015) use data of bilateral credit default swap positions to estimate the impact on collateral demand of new clearing and margin regulations. They show that mandatory central clearing lowers system-wide collateral demand provided there is no significant proliferation of CCPs. Further, central clearing does have significant distributional consequences for collateral requirements across market participants. This means that incentives may differ between market participants of various kinds, which I also attempt to gauge in this study. The authors note that central clearing can either improve or reduce netting opportunities, depending on how much is cleared, how many CCPs are used, and the degree to which the same swaps are cleared in different CCPs. The two latter points are difficult to assess in my setup, as they are not linked to the transaction level, and it is difficult to find a counterfactual for uncleared trades. But I try to gauge how the amount of previous clearing influences future decisions to centrally clear derivative contracts.

Bank for International Settlements (2014) concluded, based on a quantitative analysis, that clearing member banks have incentives to clear centrally. Central clearing incentives for market participants that clear indirectly are reported to be less obvious. The report stresses that the entities clearing derivatives indirectly are far from homogeneous, thus incentives for clearing will differ across various types of institutions. In particular, a distinction is made between "risk-takers" (e.g. hedge funds) and "hedgers" (e.g. corporates, insurers and pension funds). As noted above, I gauge this question empirically.

The work closest to this study is the paper of Bellia, Panzica, Pelizzon, and Peltonen (2017) who gauge the incentives for central clearing of single-name sovereign credit default swaps based on the same dataset as the one used in this study. They show that diverse factors explain clearing members decision to clear different CDS contracts: for Italian CDS, counterparty credit risk exposures matter most for the decision to clear, while for French and German CDS, margin costs are the most important factor for the decision. Moreover, clearing members use clearing to reduce their exposures to the CCP and largely clear contracts when at least one of the traders has a high counterparty credit risk. The main difference between their approach and the one undertaken in this study is that they concentrate on a very small and specific subset of the market (single name sovereign credit default swaps related to three countries) and are thus able to have a very detailed dataset related to the contracts and associated market data, whereas in my setup the picture is system-wide, encompassing all kinds of derivative contracts, but due to the size of and variety of contract types within the sample I am not able to obtain detailed market data on each transaction. Thus, this study is much broader, but in effect also necessarily less specific in the empirical setup. As such, the two studies complement each other very well, presenting state-of-the-art of empirical derivatives clearing research.

3. Data processing and sample

I use the regulatory reporting established under the European Market Infrastructure Regulation, which compels all counterparties to derivative contracts located within the European Union (EU) to report the details of their contracts to one of the Trade Repositories (TRs) registered by the European Securities and Markets Authority (ESMA). The EU-wide dataset is available uniquely to the European Systemic Risk Board (ESRB) and the ESMA. I use data from one of these repositories which contains a large majority of the transactions and is thus representative for the whole market, in line with earlier studies (Abad, Aldasoro, Aymanns, D'Errico, Rousova, Hoffmann, Langfield, Neychev, and Roukny, 2016; Cielinska, Joseph, Shreyas, Tanner, and Vasios, 2017; D'Errico, Battiston, Peltonen, and Scheicher, 2016). Specifically, I use all trade activity reports (which contain all new trades, and their subsequent modifications, valuation adjustments, and cancellations) for all asset classes between the beginning of March 2016 and the end of June 2017. The dataset does not contain any exchange traded derivatives, thus the sample contains almost exclusively OTC derivatives. To the best of my knowledge, it is the biggest set of data used in any study of the European derivatives market to date[1]. In this section I briefly outline how I process this data in order to arrive at the final datasets used in the subsequent study, describe the variables of interest, and present some summary statistics.

The EMIR data is reported on a transaction level, which means that the original data contains all derivative transactions covering five asset classes (commodity, credit, equity, foreign exchange, and interest rate) and all venues of execution (over-the-counter, and exchange traded) across the studied period. The dataset identifies counterparties, and contains details of the contract and its execution, valuation, and clearing in line with the reporting standards[2]. The variables of interest are presented below.

The original dataset as reported to the European Systemic Risk Board needs to be cleaned and processed in order to be useful for an analysis. In this paper I perform two such procedures. The first one is to obtain data for the purpose of calculating clearing rates (percentage of the number or volume of trades which are centrally cleared in the total number or volume of trades). The

[1] On the order of 3 terabytes of raw data files.

[2] See the implementing technical standard with regard to the format and frequency of trade reports: `http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:352:0020:0029:EN:PDF`

second one is more subtle and required for the dataset used in the analysis of the determinants of voluntary clearing of derivative contracts. Below I briefly explain both.

First, I present the method to obtain the dataset used for calculating clearing rates. This method has been agreed upon internationally as the standard method of calculating rates of central clearing in derivatives markets. Starting from the original raw dataset I retain only reports of new trades and cancellations. Then I remove trades which have been cancelled on the same day (and all the reports of cancellations), as these are assumed to be novated to cleared trades, and further remove trades resulting from compression exercises. I deduplicate the resulting dataset based on the trade identifier, and convert the notional values to euros using the ECB exchange rates. In this sample, I am only interested in the following three variables: the trade date, the notional value (in euros), and the binary variable indicating whether the trade has been centrally cleared.

Second, I present the method to obtain the final dataset used in the main part of the analysis, which investigates the determinants of voluntary clearing of derivative contracts. I start in the same way as above, retaining only reports of new trades and cancellations, and subsequently removing trades which have been cancelled on the same day (and all the reports of cancellations), and trades resulting from compression exercises. Further, I also remove trades which are subject to mandatory clearing obligation, as these would be cleared by law and not voluntarily (thus outside of the scope of this paper). To make all the reports comparable, I change all string variables into uppercase and remove all leading and trailing whitespaces. I remove all the reports with misreported variables of interest, in particular notional values (not a non-zero number) and currencies (not a valid ISO 4217 code), financial nature of the reporting counterparty (not 'F' or 'N'), cleared (not 'Y' or 'N'), trading capacity (not 'P' or 'A'), intragroup (not 'Y' or 'N'), contract with non-EEA[3] counterparty (not 'Y' or 'N'), clearing obligation (not 'N' or 'X'), and maturity date (before 2016 or after 2100). I also convert all the variables reported in currencies into euros using the ECB exchange rates. Further, I merge this dataset with other datasets available at the ESRB. In particular, I use Bureau van Dijk Orbis[4] in order to assign reporting counterparties to one of the following six groups: G16 dealers, banks (other than G16 dealers), CCPs, pension funds and insurance companies, other financial institutions (such as mutual and hedge funds), and non-financial institutions. I also use GLEIF data[5], which allows me to obtain the country of domicile of all counterparties.

Some further transformations of variables in the dataset are necessary. First, I bucket maturity date into years, as more granular data is not necessary for the analysis. Further, for each trade I calculate the number and volume of trades the reporting counterparty has traded and cleared in the previous calendar month to proxy for the involvement of the counterparties in the derivatives markets and central clearing (for this reason the final dataset in this study starts from April 2016 as March 2016 data does not have the previous month aggregates). And, for the sake of consistency I transform all the binary variables into 0s and 1s. For variables with choice between 'Y' (Yes, 1) and 'N' (No, 0) the transformation is obvious. But it is useful to mention how I approach

[3] Established outside the European Economic Area.

[4] `http://www.bvdinfo.com/en-gb/our-products/company-information/international-products/orbis`

[5] `https://www.gleif.org/en/lei-data/global-lei-index`

this transformation for the other variables. With regards to the financial nature of the reporting counterparty I assume 1 when the reporting counterparty is of financial nature and 0 otherwise. For the trading capacity variable I assume 1 for principal trades and 0 for agent trades. With regards to clearing obligation, if it is deferred I assume 1 and 0 if it the trade is not envisioned to be subject to clearing obligation.

It is useful to describe the variables of interest:

- cleared (1: Yes, 0: No) – identifies whether the contract has been centrally cleared;
- intragroup (1: Yes, 0: No) – identifies whether the contract is between entities within one group.
- maturityyear - the year in which the contract matures;
- eurnotional - gross notional value of the contract (in euros);
- clearingobligation (1: X, 0: No) – identifies whether the contract has no clearing obligation (0) or whether it is entered into before there is a clearing obligation for a given asset class (1);
- Non-EEA cpty (1: with a non-EEA counterparty, 0: without a non-EEA counterparty) – identifies whether an entity residing outside the EEA is a party to the contract;
- financial nature (1: Financial Counterparty, 0: Non-Financial Counterparty) – identifies whether the reporting counterparty of the contract is of financial nature;
- tradingcapacity (1: Principal, 0: Agent) – identifies whether the reporting counterparty of the contract has concluded the contract as principal on own account (on own behalf or behalf of a client) or as agent for the account of and on behalf of a client;
- prev.trades – identifies the number of trades within the asset class to which the reporting entity of the contract has been a counterparty in the previous calendar month;
- prev.trades.cleared – identifies the number of centrally cleared trades within the asset class to which the reporting entity of the contract has been a counterparty in the previous calendar month;
- prev.notional – identifies the total gross notional of trades within the asset class to which the reporting entity of the contract has been a counterparty in the previous calendar month;
- prev.not.cleared – identifies the total gross notional of centrally cleared trades within the asset class to which the reporting entity of the contract has been a counterparty in the previous calendar month.

Let me now turn to describing some summary statistics of this sample. I start with sample sizes as presented in Table 1. For each asset class I present the sample size for the whole dataset, and for data divided into intragroup and extragroup trades, and also trades with and without non-EEA counterparties. This is necessary as I run some of the regressions on these subsamples. Some of the sample sizes are not shown for reasons of confidentiality, although rough estimates of what could be expected there are presented in the notes below the table. The goal of the above-mentioned cleaning procedure was to keep as much data as possible, given the constraints of data quality and the empirical setup. Thus, I believe the samples are representative for the whole European derivatives market. However, the large sample sizes have a drawback. With sample sizes in millions of observations it is trivial to obtain statistically significant results. That is why I make sure to carefully analyse the size effects within the studied empirical setups and not just the statistical significance of the coefficients.

Finally, in the annex, the readers can find summary statistics for binary (Table 24) and non-binary (Table 25) dependent variables (for independent variables this can be observed in Table 1), as well as correlation tables for these variables across all asset classes (Tables 26-30).

4. Clearing rates

The first contribution of this paper is to present a picture of the central clearing of derivatives in Europe at a general level. To this end I calculate monthly and daily clearing rates of derivative contracts across all asset classes in the EU. I use the internationally agreed upon methodology for calculating clearing rates, which ensures comparability of these numbers with others reported by institutions worldwide. The methodology encompasses the cleaning procedure as described in the previous section. Broadly speaking, to calculate clearing rates I classify trades into cleared and uncleared, and ignore some categories of trades altogether. I classify trades that have never been cleared as uncleared, but ignore uncleared trades that become cleared during the analysed period to avoid double counting. I classify cleared trades where a central counterparty is one of the counterparties as cleared, but I ignore cleared trades where both counterparties are not CCPs, as these are assumed to be client legs of the previously classified cleared trades. I only use the reports of new trades, and do not use old outstanding trades or position reports. Since cleared trades are reported twice (the trade goes from one counterparty to the CCP, and from the CCP to the other counterparty), I only count half the number or volume of cleared trades in the calculations described below to adjust for such double reporting. Of note, uncleared trades as well as both sides of the cleared trades have double reporting in addition to the above, but these are accounted for when removing duplicates according to trade identifiers within the cleaning procedure. Then, to calculate clearing rates (and, as an intermediate step, the adjusted total gross notional), I follow the same calculation that is used by the FSB[6], the Bank of England[7], and the ISDA[8]:

$$\text{Adj. Total Gross Notional} = \frac{\text{Notional of cleared trades}}{2} + \text{Notional of uncleared trades} \tag{1}$$

$$\text{Clearing rate} = \frac{(\text{Notional of cleared trades}/2)}{\text{Adj. Total Gross Notional}} \tag{2}$$

Clearing rates are usually represented as the percent of notional cleared to the total notional traded, but it can also be presented as the percent of the number of cleared trades to the total

[6] http://www.fsb.org/wp-content/uploads/OTC-Derivatives-10th-Progress-Report.pdf

[7] http://www.bankofengland.co.uk/publications/Documents/fmi/annualreport2016.pdf

[8] http://www2.isda.org/functional-areas/research/research-notes/

Table 1: Sample size by asset classes and their subgroups, as used in the forthcoming regressions, together with the number of cleared trades within these groups.

Asset class	Subset	Sample size	Cleared	% Cleared
Commodity	Full sample	4,296,374	29,348	0.68
Commodity	Intragroup	526,013	*	*
Commodity	Extragroup	3,770,361	*	*
Commodity	Within EEA	2,563,671	14,051	0.55
Commodity	With non-EEA	1,732,703	15,297	0.88
Credit	Full sample	1,814,047	247,714	13.66
Credit	Intragroup	†	†	†
Credit	Extragroup	†	†	†
Credit	Within EEA	560,595	***	***
Credit	With non-EEA	1,253,452	***	***
Equity	Full sample	12,320,166	56,749	0.46
Equity	Intragroup	2,849,898	0	0.00
Equity	Extragroup	9,470,268	56,749	0.60
Equity	Within EEA	4,381,137	55,661	1.27
Equity	With non-EEA	7,939,029	1,088	0.01
Foreign Exchange	Full sample	60,627,185	659,848	1.09
Foreign Exchange	Intragroup	6,644,383	4,138	0.06
Foreign Exchange	Extragroup	53,982,802	655,710	1.21
Foreign Exchange	Within EEA	28,128,714	**	**
Foreign Exchange	With non-EEA	32,498,471	*	*
Interest Rate	Full sample	4,231,413	2,010,329	47.51
Interest Rate	Intragroup	685,089	9,317	1.36
Interest Rate	Extragroup	3,546,324	2,001,012	56.42
Interest Rate	Within EEA	2,338,383	****	****
Interest Rate	With non-EEA	1,893,030	***	***

Notes: Items not shown due to reasons of confidentiality:
†Split in line with other asset classes.
*Less than 1%.
**Between 2-5%.
***Between 10-20%.
****Over 50%.

number of trades in a given period. To calculate the latter, the above equations can still be used, but substituting notional of trades for their count. I present the results for both types of clearing rates below.

In Figure 1 I present the rates of central clearing based on the notional values. As can readily be observed, commodity, equity, and foreign exchange derivatives are barely centrally cleared. However, on the order of 20% of the notional of credit derivatives is being centrally cleared. The interest rate derivatives are the most commonly cleared, with about 40% of their notional being centrally cleared. These figures fluctuate over the studied period, but have no clear trend. Of note, had exchange traded derivatives been included in the sample, a larger clearing rate would have be observed for equity and foreign exchange derivatives, some of which are centrally cleared by market convention.

A similar picture appears in Figure 2, where I present the clearing rates in terms of the number of trades cleared in the total number of trades. The first difference is that the level of the clearing rate for credit derivatives is slightly lower in terms of the number of trades, hinting that trades with large notional are cleared more often. This does not appear to be the case for interest rate derivatives. Another difference can be observed with commodity and equity derivatives, where the clearing rate in terms of the number of trades is no longer as close to zero as is the case with clearing rates based on the notional values. This, conversely to the above, hints that the commodity and equity contracts with large notional values are presumably cleared less than smaller trades. I test this formally in the next section.

The above-mentioned clearing rates have been calculated on a monthly basis. These can of course be calculated with any frequency. Using daily frequency there is a lot of heterogeneity across days, as observed in Figure 3, where I present daily clearing rates for credit and interest rate derivatives. One can clearly see that the average monthly values presented above come from a set of daily clearing rates characterised by a wide dispersion of results.

The presented clearing rates compare the contracts which have been cleared with all contracts in the market. It may be more useful to compare the contracts which have been cleared with all contracts in the market which could in principle be cleared. Both due to difficulties in defining what is clearable, and due to the complex nature, heterogeneity, and the size of the sample used in this study, it would be difficult to reliably estimate the clearable part of the market. To put the above results in perspective it is useful to mention estimates of the percentage of trades that can in principle be centrally cleared as provided in the FSB Twelfth Progress Report on Implementation of the OTC Derivatives Market Reforms. For interest rate derivatives four jurisdictions estimated that between 80% and 100% of new transactions could be centrally cleared, six jurisdictions estimated it to be between 60% and 80%, two jurisdictions estimated it to be between 40% and 60%, and one jurisdiction estimated it to be below 20%. For credit derivatives, two jurisdictions estimated that between 40% and 60% of new transactions could be centrally cleared, two jurisdictions estimated it to be between 20% and 40%, and two jurisdictions estimated it to be below 20% (Financial Stability Board, 2017).

To put these results in perspective, in Figure 4 I present the adjusted total gross notional, as defined above, for the five asset classes across the studied period. It can be seen that foreign exchange, interest rate, and equity derivatives have a total gross notional on the order of 10^{14} EUR (hundreds of trillions of euros) per month. Credit and commodity derivatives are closer to 10^{12} EUR (trillions of euros). Further, in Figure 5 I present the total number of trades for the five asset classes across the studied period. All asset classes have between ten thousand and ten million of new trades per month within the European Union, with foreign exchange leading this statistic and credit derivatives being in the last place.

Having in mind that credit and interest rate derivatives are the only classes with significant share of central clearing, I will concentrate on these asset classes in the analysis of the determinants of voluntary clearing, but the results will be presented for all asset classes for the sake of completeness.

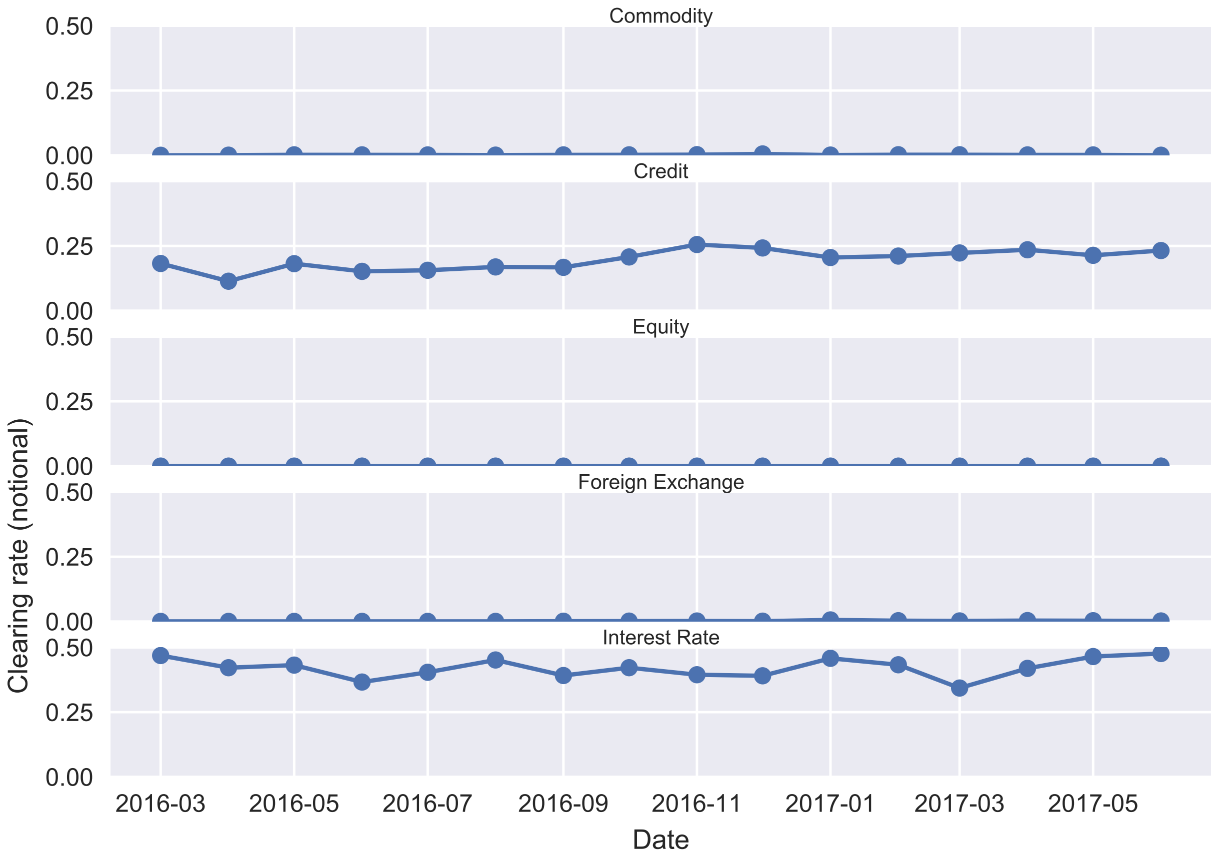

Fig. 1. Monthly clearing rates (percentage of gross notional cleared through a central counterparty in total gross notional of trades reported in a given month) across five major asset classes in the European derivatives market (March 2016 - June 2017).

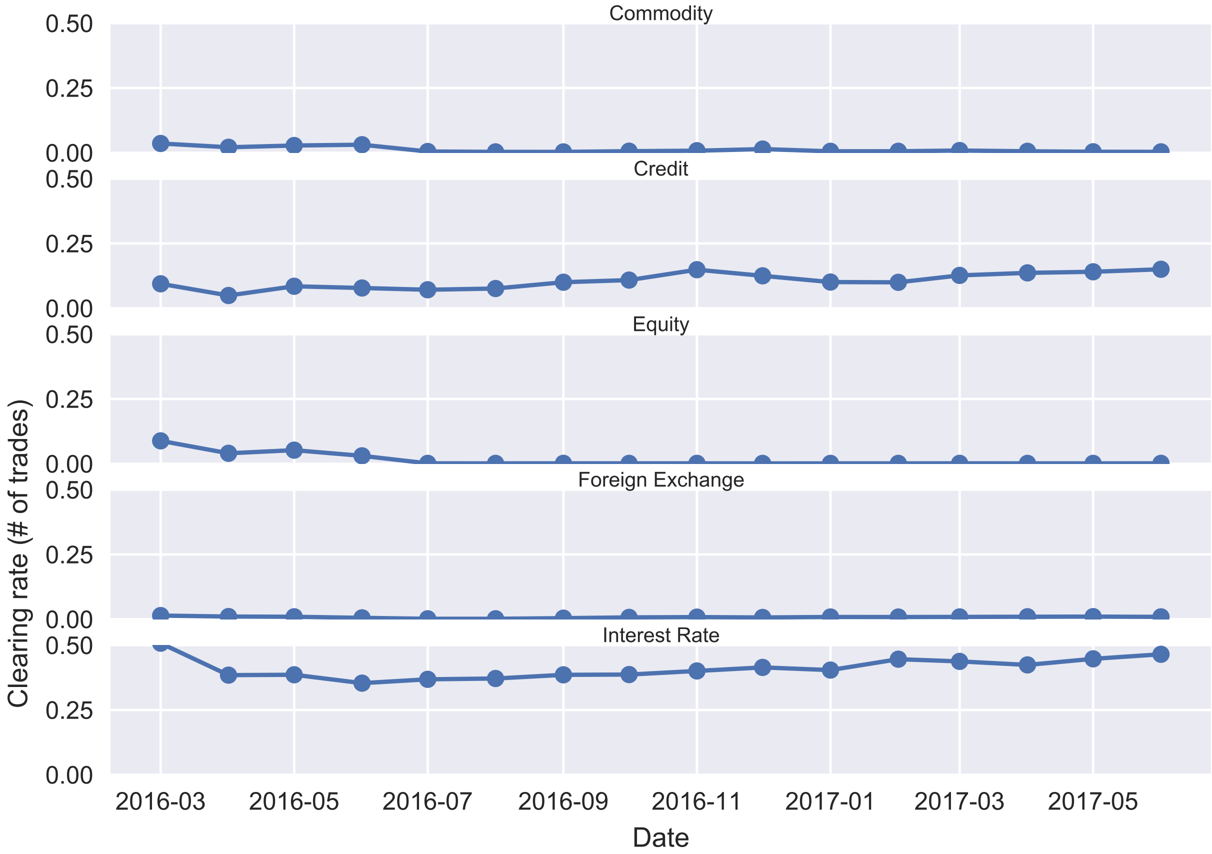

Fig. 2. Monthly clearing rates (percentage of trades cleared through a central counterparty in total number of trades reported in a given month) across five major asset classes in the European derivatives market (March 2016 - June 2017).

5. Voluntary clearing

The second, and the most important, contribution of this paper is to analyse formally the determinants of voluntary clearing of derivative contracts in the European Union. This study is important and useful for many purposes. It sheds light on theoretical literature on central clearing of derivative contracts, guiding some of the modelling assumptions around the decision of the economic agents to clear their contracts. Further, it informs policy makers in their deliberations around the feasibility and market impact of clearing obligation for various types of derivative contracts. Finally, it gives a wide audience an opportunity to have a detailed grasp on the state of central clearing of derivative contracts in the European Union beyond the legal obligation.

The study of the determinants of voluntary clearing is divided into seven distinct hypotheses. These will be discussed in turn within this section. Some of them are based on the questions raised in theoretical literature as described in Section 2, and some of them are driven by the availability of empirical data or the questions raised in the discussions among regulators and policy makers.

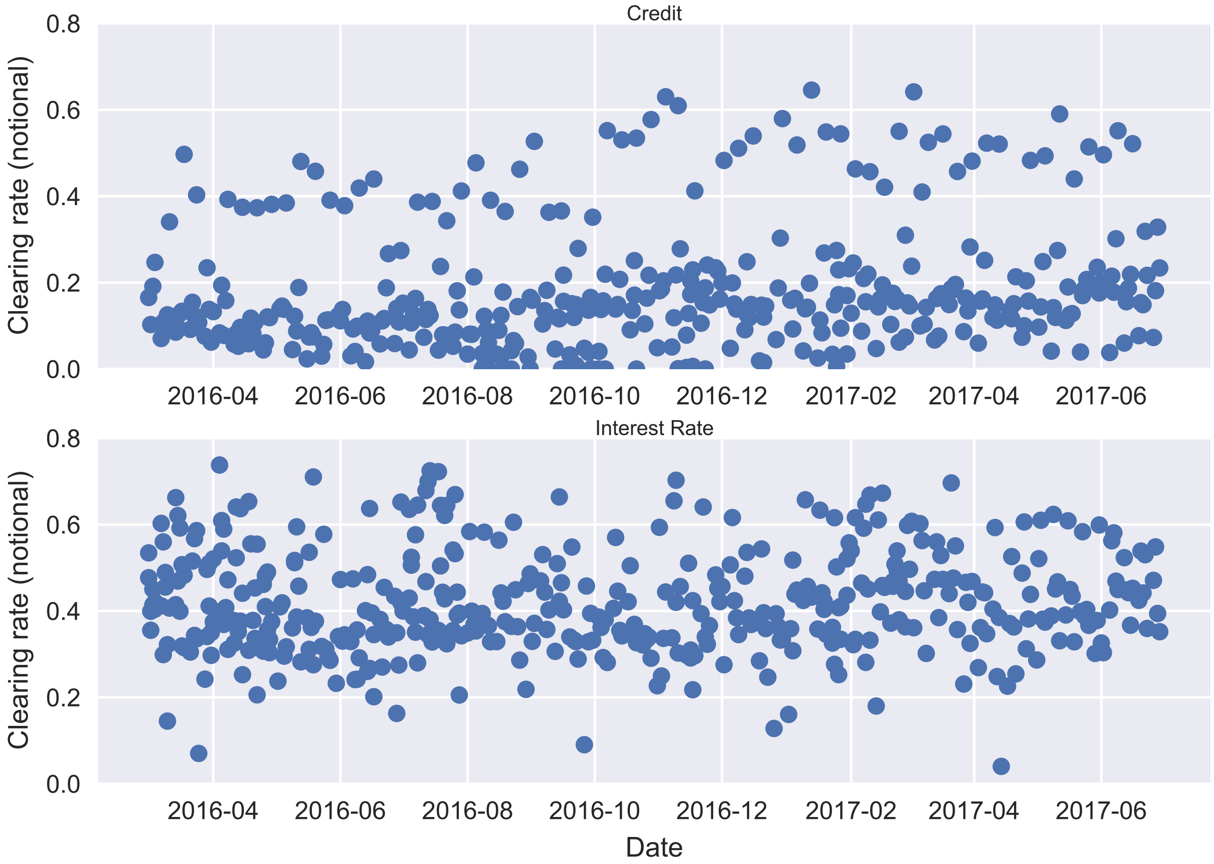

Fig. 3. Daily clearing rates (percentage of gross notional cleared through a central counterparty in total gross notional of trades reported in a given day) across two asset classes with significant fraction of cleared trades in the European derivatives market (March 2016 - June 2017).

The order of these has a purpose, such that the hypotheses are supposed to build upon each other as much as possible.

There are some general remarks of note before I turn to specific hypotheses and models. Contrary to other large jurisdictions, such as the United States, the EU has introduced the mandatory clearing gradually, phasing-in the obligation for different groups of counterparties over several years. For this reason, the clearing obligation is not fully stable across the studied period. This has an obvious implication for the empirical setup. I need (month) time fixed effects in every model, as to catch such heterogeneity across the studied period. In some of the models I also employ counterparty type fixed effects, where appropriate. The full robustness checks against various fixed effects can be found in the annex.

Further, this study aims to provide a very general picture of central clearing within the overall derivatives market in the European Union. Thus, I ignore some of the specifics that may be interesting but are left for more detailed studies. For instance, having such a large and varied

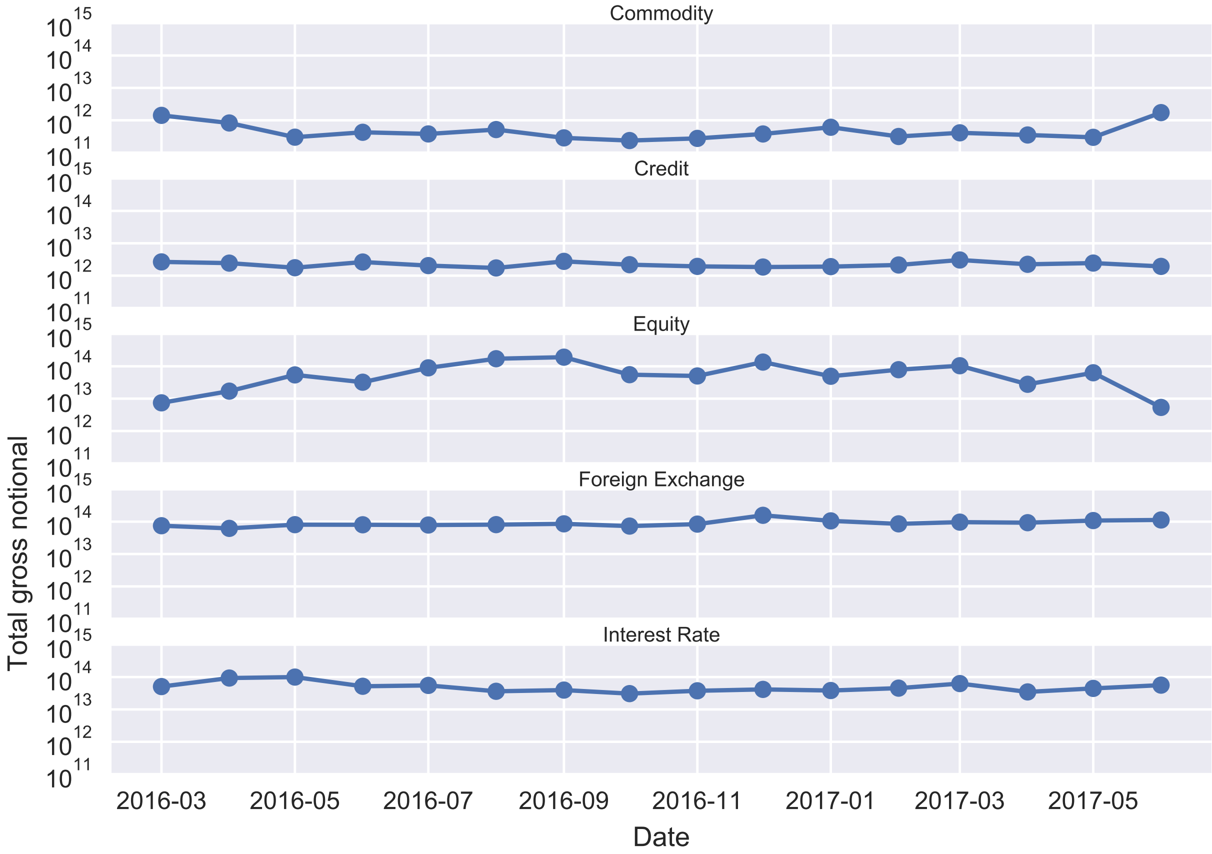

Fig. 4. Total gross notional (in EUR) of trades reported in a given month across five major asset classes in the European derivatives market (March 2016 - June 2017).

sample, it is difficult to gather reliable market data. It would be insightful but also very difficult to comprehensively establish if all the trades across many types of instruments would satisfy the CCP eligibility for clearing criteria. This question is being answered in a detailed study of sovereign credit default swaps (Bellia et al., 2017). I have also left certain distinctions, such as between OTC and exchange-traded derivatives or between specific instruments within the broad asset classes for future studies.

Finally, the sample period does not contain the time since the mandatory exchange of variation margins for bilateral trades has entered into force. Market intelligence suggests that this has changed the appetite for central clearing. It is unlikely to alter the general conclusions of this paper significantly, nonetheless it would be useful to study this event in future research. More generally, the setup of this study does not allow to directly include the costs of bilateral clearing into the empirical setup, both due to the size and complexity of the used sample and also due to inherent difficulty in quantifying these. This is an important part of the consideration however, and is hoped to be explored in future studies.

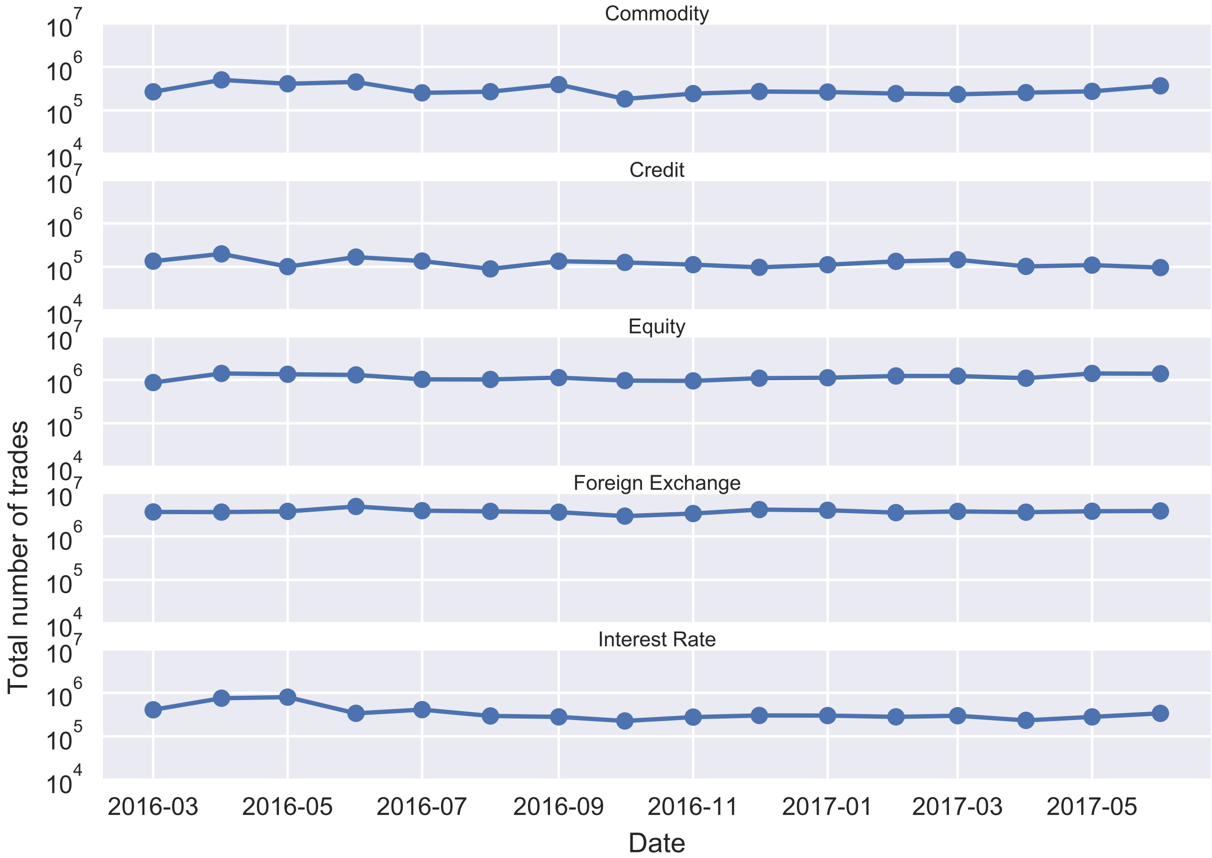

Fig. 5. Total number of trades reported in a given month across five major asset classes in the European derivatives market (March 2016 - June 2017).

Hypothesis 1: intragroup trades

It is trivial to guess whether intragroup trades are cleared less than other trades, given significantly lower counterparty risk against entities within the same group. Nonetheless, it is still interesting to observe how strong the difference in central clearing is between intragroup and extragroup trades, also looking at the samples. For example, over 56% of extragroup interest rate derivative contracts in my sample have been centrally cleared. The same number for the intragroup contracts is around 1.4%. Similar picture appears for other asset classes, as shown in Table 1. It may be interesting to see whether the implementation of structural reform in the United Kingdom will affect this picture. The results of testing this hypothesis will also lead to some modelling choices for the forthcoming hypotheses.

To test the first hypothesis, which conjectures that intragroup trades are less likely to be centrally cleared on a voluntary basis, I estimate the below equation using a conditional probit model, the choice of which is subject to robustness checks as presented in Tables 31-34:

$$Pr(\text{cleared}_i = 1) = \Phi(\alpha + \beta \text{ intragroup}_i + \gamma_t) + \epsilon_i \quad (3)$$

My hypothesis is confirmed if I find a statistically significant and negative coefficient of the intragroup dummy variable β. I employ time fixed effects, which capture time trends, changes in reporting standards and the clearing obligation, but I do not saturate the model with country or counterparty type fixed effects given the results of robustness checks as described in the annex. In the annex I also present checks for robustness w.r.t. various control variables, but find them unnecessary with the exception of the trade being with or without a non-EEA counterparty. I only check for robustness within credit and interest rate derivatives, as they are of the main interest. In Tables 31 & 33 it is apparent that adding other kinds of fixed effects (counterparty type, country, type-month) to time fixed effects would not strongly alter the relevant coefficient. In Tables 32 & 34 I present how adding various control variables would affect the relevant coefficient. It can be readily observed that even adding the full set of control variables would not change the coefficient of interest in a meaningful way, thus I opt for the simpler specification. Similar robustness checks are presented for each hypothesis, but in the interest of space I do not discuss them in detail for every hypothesis, and instead mention only the relevant points.

I estimate the above equation for all trades (i stands for the ordinal number of each trade) for each asset class[9], and then separately for trades with a non-EEA counterparty and for trades without such counterparty being involved (also separately for each asset class). This is to check whether trades within the same group but with entities in different jurisdictions outside the EEA are more likely to be cleared, which can be conjectured based on more separation between such entities on various grounds: including legally and through the involvement of multiple supervisors, and through the lack of equivalent regulation.

In line with the above, I am mostly interested in credit and interest rate derivatives, thus in the rest of the paper I interpret results for these two asset classes, mentioning the other ones only when interesting results appear. This also due to the fact that the results for other asset classes may be less robust given low rates of central clearing. In particular, within this hypothesis the results for equity derivatives are to be ignored, as there are zero intragroup equity derivatives which are centrally cleared. For this reason, the appropriate coefficients for equity derivatives are not statistically significant.

As can be seen in Table 2, I cannot reject the first hypothesis for both credit and interest rate derivatives. Interestingly, for credit derivatives the results are stronger when a non-EEA counterparty is present, but if both counterparties are within the EEA the hypothesis can be rejected. For interest rate derivatives I observe less surprising results, with the appropriate effect stronger for trades with a non-EEA counterparty. The difference could stem from the different composition of intragroup trades in contracts with two EEA counterparties. Finally, in Table 5 I present the effect size for the model testing the first hypothesis based on the full sample. Given the sample size I would expect statistical significance to be easy to achieve for most coefficients, thus

[9] CO: commodity, CR: credit, EQ: equity, FX: foreign exchange, IR: interest rate.

effect size can be helpful in analysing the economic significance of the results. As can be seen, the dependence between central clearing of a contract and it being intragroup is strongly negative for both credit and interest rate derivatives. For interest rate derivatives this dependence is weaker if I account for the involvement of non-EEA counterparties in the contracts. For credit derivatives there is no large change in the strength of the dependence if I account for this variable.

The estimated conditional probit model is non-linear, thus further complicating economic interpretation of the coefficients. For this reason in Figure 6 I plot response rates (predicted clearing rates) based on theoretical characteristics of a contract that would be entered into at the end of the studied period. In particular, I distinguish between various asset classes, trades being intragroup or extragroup, and trades being with a non-EEA counterparty or not. As the model is built for testing the specific hypothesis, these predicted clearing rates should not be interpreted as predictions per se, but rather as an indication of the magnitude of change in the probability of a contract being centrally cleared based on it being within a group or not, and other secondary characteristics. For example, it can be seen that an extragroup interest rate derivative contract within the EEA is over twice as likely to be cleared than an equivalent contract with a non-EEA counterparty, whereas for credit derivatives these probabilities would be roughly the same. It would not be strictly appropriate to say that an extragroup interest rate derivative contract within the EEA has around 80% chance of being centrally cleared, as the empirical setup is not prepared for such an inference.

As there is a strong difference between intragroup and extragroup contracts in terms of central clearing, with the former being less of interest both for practical purposes of policy and due to their response functions being flat (as in Figure 6), I will attempt to concentrate on results for trades outside of a group for the other hypotheses, where it makes sense.

Hypothesis 2: maturity

One would expect that contracts with longer maturity would tend to be cleared more often, as the longer an entity is exposed to a counterparty the more uncertainty over that counterparty's behaviour there is and the more difficult the modelling of the counterparty risk becomes. Offloading such risk to a central counterparty would then make sense for contracts with a maturity measured in decades. Further, there is also some uncertainty whether long-term contracts will not fall into clearing obligation during the lifetime of the contract, adding to the theoretical incentives for clearing contracts with long maturities. On the other hand, it is possible that contracts with short maturities (as the majority of derivative contracts) are more standardised and thus better suited for central clearing and better suited for taking advantage of its benefits.

To test the second hypothesis, which conjectures that trades with longer maturity are more likely to be centrally cleared on a voluntary basis, I estimate the below equation using a conditional probit model, the choice of which is subject to robustness checks as presented in Tables 35-38:

Table 2: Results for hypothesis 1 (full sample), estimated with a conditional probit model (Equation 3). The dependent binary variable denotes whether a contract is centrally cleared. intragroup denotes whether a contract is between entities within the same group. The full sample of all new derivative contracts is from April 2016 until June 2017.

	cleared (full sample)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
intragroup	-2.030^{***}	-2.614^{***}	-3.579	-0.940^{***}	-2.382^{***}
	(0.090)	(0.020)	(2.417)	(0.011)	(0.004)
Constant	-3.225^{***}	-1.132^{***}	-2.678^{***}	-2.733^{***}	0.150^{***}
	(0.017)	(0.005)	(0.006)	(0.007)	(0.002)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413
McFadden's R^2	0.221	0.143	0.043	0.047	0.158
Notes:	***Significant at the 1 percent level.				
	**Significant at the 5 percent level.				
	*Significant at the 10 percent level.				

Table 3: Results for hypothesis 1 (with non-EEA counterparty), estimated with a conditional probit model (Equation 3). The dependent binary variable denotes whether a contract is centrally cleared. intragroup denotes whether a contract is between entities within the same group. The full sample of all new derivative contracts where one of the counterparties has been established outside of the EEA is from April 2016 until June 2017.

	cleared (with non-EEA)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
intragroup	-4.438	-2.646^{***}	-3.391	-0.196^{***}	-1.722^{***}
	(9.217)	(0.020)	(36.431)	(0.024)	(0.005)
Constant	-6.223	-1.095^{***}	-3.422^{***}	-3.235^{***}	-0.652^{***}
	(16.942)	(0.006)	(0.021)	(0.020)	(0.004)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Observations	1,732,703	1,253,452	7,939,029	32,499,985	1,893,030
McFadden's R^2	0.378	0.200	0.179	0.078	0.128
Notes:	***Significant at the 1 percent level.				
	**Significant at the 5 percent level.				
	*Significant at the 10 percent level.				

Table 4: Results for hypothesis 1 (with two EEA counterparties), estimated with a conditional probit model (Equation 3). The dependent binary variable denotes whether a contract is centrally cleared. intragroup denotes whether a contract is between entities within the same group. The full sample of all new derivative contracts between two entities established in the EEA is from April 2016 until June 2017.

	cleared (within EEA)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
intragroup	-1.660^{***}	-4.239	-4.087^{***}	-1.137^{***}	-2.631^{***}
	(0.094)	(3.529)	(3.055)	(0.012)	(0.007)
Constant	-3.121^{***}	-1.178^{***}	-2.322^{***}	-2.513^{***}	0.599^{***}
	(0.018)	(0.007)	(0.007)	(0.008)	(0.003)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Observations	2,563,671	560,595	4,381,137	28,127,200	2,338,383
McFadden's R^2	0.125	0.034	0.104	0.063	0.120

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 5: Effect size for hypothesis 1 (full sample), with odds ratio of trade not being cleared given it being within a group (OR), Pearson's correlation coefficient between trade being cleared and it being within a group ($\rho(X,Y)$), partial correlation coefficient controlling for whether trade is with a non-EEA counterparty ($\rho(X,Y|Z)$), and mutual information (MI) and partial mutual information $MI(X,Y|Z)$ set up in the same way as the correlation coefficients.

	(CO)	(CR)	(EQ)	(FX)	(IR)
OR	687.607	600.860	N/A*	19.731	93.920
$\rho(X,Y)$	-0.031	-0.243	-0.037	-0.035	-0.406
$\rho(X,Y\|Z)$	-0.034	-0.236	-0.068	-0.040	-0.310
MI(X,Y)	0.001	0.047	0.001	0.001	0.106
$MI(X,Y\|Z)$	0.001	0.045	0.002	0.001	0.067
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413

Notes: All values significant at the 1 percent level.
*Not defined (0 intragroup cleared trades).

$$Pr(\text{cleared}_i = 1) = \Phi(\alpha + \beta_1 \text{ maturityyear}_i + \beta_2 \log(\text{eurnotional})_i + \beta_3 \text{ clearingobligation}_i + \gamma_t) + \epsilon_i \tag{4}$$

My hypothesis is confirmed if I find a statistically significant and positive coefficient of the year of maturity variable β_1. I employ time fixed effects, which capture time trends, changes in reporting standards and the clearing obligation, but I do not saturate the model with country or counterparty type fixed effects given the results of robustness checks as described in the annex. In the annex I also present checks for robustness w.r.t. various control variables, which led to the inclusion of the notional of the contract and the clearing obligation status (which together with the trades being intragroup are the only variables affecting the results of interest to this hypothesis). I use the notional value in logarithm, in line with the standard practice in financial economics.

I estimate the above equation for all trades for each asset class, and then separately for trades which are not intragroup. This is following the testing of the first hypothesis, where I have shown that intragroup trades are of less interest to this study. Thus, it is interesting to see whether the results without intragroup trades are qualitatively different.

As can be seen in Table 6, trades with longer maturity are more likely to be centrally cleared for interest rate and foreign exchange contracts. Conversely, for credit derivatives (together with commodity and equity derivatives) the opposite is the case. This may hint that credit derivatives are more standardised for short-term contracts w.r.t. long-dated contracts, which does not appear to be the case for interest rate derivatives. The effect is stronger if I ignore intragroup trades, as shown in Table 7. Finally, in Table 8 I present the effect size for the model testing the second hypothesis based on the full sample. As can be seen, there is a positive correlation between central clearing of a contract and its maturity date for interest rate derivatives and a negative one for credit derivatives. These correlations become stronger if I account for mediating influence of the intragroup trades. Curiously, mutual information for credit derivatives is higher than partial mutual information accounting for the influence of intragroup trades. This hints at the possibility that the relationship between maturity year of a contract, it being cleared, and it being within a group is non-linear. Some of such strong non-linear dependence between central clearing and maturity date would then be explained by the involvement of intragroup trades.

In Figure 7 I plot response rates (predicted clearing rates) based on theoretical characteristics of a contract that would be entered into at the end of the studied period. In particular, I distinguish between various asset classes, maturity year, inclusion or not of intragroup trades, and the type of clearing obligation status. These predictions are based on a median notional within the asset class (see Table 25 for details). It can be seen that interest rate derivative contracts are more likely to be cleared as the maturity becomes longer, whereas the opposite is the case for credit derivatives. These two increase or decrease in a roughly linear manner. Interestingly, the probability of foreign exchange derivatives being cleared increases with the maturity date, but in a highly non-linear fashion.

Table 6: Results for hypothesis 2 (full sample), estimated with a conditional probit model (Equation 4). The dependent binary variable denotes whether a contract is centrally cleared. maturityyear denotes whether the year in which a contract matures. I control for log(eurnotional), which denotes the logarithm of the gross notional value of the contract, and clearingobligation, which denotes whether the clearing obligation has been deferred or is not envisioned. The full sample of all new derivative contracts is from April 2016 until June 2017.

	cleared (full sample)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
maturityyear	−0.078***	−0.008***	−0.064***	0.055***	0.012***
	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)	0.090***	0.131***	−0.019***	0.074***	0.053***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
clearingobligation	−0.540***	−0.731***	−3.187***	1.431***	−0.192***
	(0.008)	(0.003)	(0.008)	(0.036)	(0.001)
Constant	153.300***	13.406***	127.200***	−116.900***	−25.340***
	(7.158)	(0.384)	(0.696)	(0.951)	(0.148)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413
McFadden's R^2	0.245	0.080	0.550	0.151	0.016
Notes:	***Significant at the 1 percent level.				
	**Significant at the 5 percent level.				
	*Significant at the 10 percent level.				

Table 7: Results for hypothesis 2 (extragroup), estimated with a conditional probit model (Equation 4). The dependent binary variable denotes whether a contract is centrally cleared. maturityyear denotes whether the year in which a contract matures. I control for log(eurnotional), which denotes the logarithm of the gross notional value of the contract, and clearingobligation, which denotes whether the clearing obligation has been deferred or is not envisioned. The full sample of all new derivative contracts that are not between two entities within the same group is from April 2016 until June 2017.

	cleared (extragroup)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
maturityyear	−0.119***	−0.022***	−0.072***	0.056***	0.017***
	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)	0.099***	0.142***	−0.041***	0.074***	0.044***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
clearingobligation	−1.482***	−0.413***	−3.284***	1.482***	−0.053***
	(0.011)	(0.003)	(0.008)	(0.039)	(0.001)
Constant	236.700***	41.744***	144.170***	−117.300***	−35.770***
	(8.754)	(0.480)	(0.750)	(1.018)	(0.171)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Observations	3,770,361	†	9,470,268	53,982,802	3,546,324
McFadden's R^2	0.296	0.085	0.555	0.150	0.016

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
†Not shown for reasons of confidentiality.

Table 8: Effect size for hypothesis 2 (full sample), with Pearson's correlation coefficient between trade being cleared and its year of maturity ($\rho(X,Y)$), partial correlation coefficient controlling for whether trade is within a group ($\rho(X,Y|Z)$), and mutual information (MI) and partial mutual information $MI(X,Y|Z)$ set up in the same way as the correlation coefficients.

	(CO)	(CR)	(EQ)	(FX)	(IR)
$\rho(X,Y)$	−0.013	−0.015	0.012	0.289	0.060
$\rho(X,Y\|Z)$	−0.012	−0.069	0.012	0.289	0.088
MI(X,Y)	0.001	0.044	0.014	0.007	0.011
$MI(X,Y\|Z)$	0.001	0.023	0.014	0.006	0.012
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413

Notes: All values significant at the 1 percent level.

Hypothesis 3: notional value

One of the key aspects of any derivative contract is its notional value. The notional value has a different characteristic scale and distribution for different types of contracts, as can be seen in Table 24. Nonetheless, for any asset class with a growing notional value of a contract the risk exposure grows as well. For large exposures to major counterparties the central counterparty should in principle be better placed to manage such risks (Ghamami and Glasserman, 2017). On the other hand, entities may believe they have better information about their major counterparties than a central counterparty would (Antinolfi, Carapella, and Carli, 2016), which could lead to preference for bilateral trades with major counterparties due to the reliance on private information within the in-house risk management of these entities. I test empirically whether large notional is associated with higher likelihood of a derivative contract being cleared in the European Union.

To test the third hypothesis, which conjectures that trades with larger notional values are more likely to be centrally cleared on a voluntary basis, I estimate the below equation using a conditional probit model, the choice of which is subject to robustness checks as presented in Tables 39-42:

$$
\begin{aligned}
Pr(\text{cleared}_i = 1) =& \Phi(\alpha + \beta_1 \log(\text{eurnotional})_i + \beta_2 \text{ maturityyear}_i \\
&+ \beta_3 \text{ Non-EEA cpty}_i + \gamma_t) + \epsilon_i
\end{aligned}
\tag{5}
$$

I use the notional values in logarithm, in line with the standard practice in financial economics. My hypothesis is confirmed if I find a statistically significant and positive coefficient of the log of notional value variable β_1. I employ time fixed effects, which capture time trends, changes in reporting standards and the clearing obligation, but I do not saturate the model with country or counterparty type fixed effects given the results of robustness checks as described in the annex. In the annex I also present checks for robustness w.r.t. various control variables, which led to the inclusion of the maturity of the contract and the involvement of non-EEA counterparty in the contract.

I estimate the above equation for all trades for each asset class, and then separately for trades which are not intragroup, for the same reason as in the previous hypothesis.

As can be seen in Table 9, trades with larger notional value are more likely to be centrally cleared (except in the case of equity derivatives). If I ignore intragroup trades the effect is stronger for credit derivatives but weaker for interest rate derivatives, as shown in Table 10. Finally, in Table 11 I present the effect size for the model testing the third hypothesis based on the full sample. As can be seen, there is a positive correlation between central clearing of a contract and its notional value for both credit and interest rate derivatives. The correlation becomes stronger for credit derivatives and weaker for interest rate derivatives if I account for mediating influence of the intragroup trades. Thus, it appears that there are statistically significant economies of scale involved in clearing credit and interest rate derivative contracts associated with the size of the contract. Below I show other type of economies of scale within the realm of clearing derivative contracts.

In Figure 8 I plot response rates (predicted clearing rates) based on theoretical characteristics of a contract that would be entered into at the end of the studied period. In particular, I distinguish between various asset classes, notional value, inclusion or not of intragroup trades, and the involvement of non-EEA counterparties. It can be seen that for both credit and interest rate derivative contracts the larger the notional value the larger the probability of the contract being cleared. Interestingly, this relationship is much stronger for credit derivatives. These contracts with small notional are not expected to be cleared but such contracts with large notional have up to around 90% likelihood of being cleared. In the case of interest rate derivatives the difference is less pronounced and on the order of 20 percentage points.

Hypothesis 4: contracts with non-EEA counterparties

While testing the first hypothesis I showed that the involvement of a non-EEA counterparty alters the relationship between the contract being within a group and the same contract being centrally cleared. However, the effect of the contract being with a non-EEA counterparty is interesting in its own right. One would expect that trading with counterparties from significantly different jurisdictions would bring with it counterparty risk that is more difficult to manage. There are multiple reasons for that, one of which is that it is not trivial to anticipate the interaction between counterparty risk and the fluidity of the regulatory regime outside of Europe. For this reason it may be easier for such counterparty risk to be managed by central counterparties. On the other hand, as two counterparties from different jurisdictions are likely to have different main central counterparties serving their business, thus central clearing of contracts between such counterparties may not benefit from the netting of margins to a great extent, in turn leading to these contracts having a tendency not to be centrally cleared. I empirically test whether this is the case.

Table 9: Results for hypothesis 3 (full sample), estimated with a conditional probit model (Equation 5). The dependent binary variable denotes whether a contract is centrally cleared. log(eurnotional) denotes the logarithm of the gross notional value of the contract. I control for maturityyear, which denotes whether the year in which a contract matures, and Non-EEA cpty, which denotes whether the one of the counterparties to a contract has been established outside of the EEA. The full sample of all new derivative contracts is from April 2016 until June 2017.

	cleared (full sample)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
log(eurnotional)	0.092***	0.137***	−0.015***	0.085***	0.036***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
maturityyear	−0.069***	−0.001***	−0.001***	0.041***	0.013***
	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)
Non-EEA cpty	0.135***	−0.240***	−1.407***	−1.364***	−1.340***
	(0.005)	(0.003)	(0.008)	(0.006)	(0.001)
Constant	135.900***	−1.344***	−0.837*	87.180***	−26.010***
	(6.818)	(0.363)	(0.362)	(0.259)	(0.159)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413
McFadden's R^2	0.235	0.049	0.150	0.251	0.192

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 10: Results for hypothesis 3 (extragroup), estimated with a conditional probit model (Equation 5). The dependent binary variable denotes whether a contract is centrally cleared. log(eurnotional) denotes the logarithm of the gross notional value of the contract. I control for maturityyear, which denotes whether the year in which a contract matures, and Non-EEA cpty, which denotes whether the one of the counterparties to a contract has been established outside of the EEA. The full sample of all new derivative contracts that are not between two entities within the same group is from April 2016 until June 2017.

	cleared (extragroup)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
log(eurnotional)	0.109***	0.144***	−0.029***	0.081***	0.024***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
maturityyear	−0.076***	−0.021***	−0.000*	0.041***	0.015***
	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)
Non-EEA cpty	0.145***	0.132***	−1.594***	−1.398***	−1.216***
	(0.005)	(0.003)	(0.008)	(0.006)	(0.001)
Constant	149.500***	38.180***	−1.295***	−85.870***	−29.740***
	(6.592)	(0.475)	(0.386)	(0.261)	(0.182)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Observations	3,770,361	†	9,470,268	53,982,802	3,546,324
McFadden's R^2	0.251	0.075	0.201	0.255	0.163

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
†Not shown for reasons of confidentiality.

Table 11: Effect size for hypothesis 3 (full sample), with Pearson's correlation coefficient between trade being cleared and log of its gross notional exposure ($\rho(X,Y)$), and partial correlation coefficient controlling for whether trade is within a group ($\rho(X,Y|Z)$).

	(CO)	(CR)	(EQ)	(FX)	(IR)
$\rho(X,Y)$	0.034	0.152	−0.011	0.036	0.076
$\rho(X,Y\|Z)$	0.043	0.166	−0.010	0.034	0.035
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413

Notes: All values significant at the 1 percent level.

To test the fourth hypothesis, which conjectures that trades with non-EEA counterparties are more likely to be centrally cleared on a voluntary basis, I estimate the below equation using a conditional probit model, the choice of which is subject to robustness checks as presented in Tables 43-46:

$$Pr(\text{cleared}_i = 1) = \Phi(\alpha + \beta_1 \text{ Non-EEA cpty}_i + \gamma_t) + \epsilon_i \tag{6}$$

My hypothesis is confirmed if I find a statistically significant and positive coefficient of the dummy variable indicating the involvement of a non-EEA counterparty β_1. I employ time fixed effects, which capture time trends, changes in reporting standards and the clearing obligation, but I do not saturate the model with country or counterparty type fixed effects given the results of robustness checks as described in the annex. In the annex I also present checks for robustness w.r.t. various control variables, based on which no control variables have been included in this model.

I estimate the above equation for all trades for each asset class, and then separately for trades which are not intragroup, for the same reason as in the previous hypothesis.

As can be seen in Table 12, trades which involve a non-EEA counterparty are less likely to be centrally cleared (with the exception of commodity derivatives). The effect seems to be stronger for interest rate than for credit derivatives. Of note, if I ignore intragroup trades, as shown in Table 13, the result for credit derivatives changes, so that credit derivatives that are not traded between entities within a group are more likely to be centrally cleared if the contract involves a non-EEA counterparty. So it seems that for extragroup contracts the situation differs between asset classes. For credit derivative contracts the benefits of clearing trades with counterparties within the EEA seem to outweigh the benefits of managing counterparty risk with entities from outside the EEA. The opposite is the case for interest rate derivatives. Finally, in Table 14 I present the effect size for the model testing the third hypothesis based on the full sample. These numbers give a better idea of the strength of the dependence between the involvement of non-EEA counterparties and the propensity for clearing, but provide qualitatively the same picture as explained above.

In Figure 9 I plot response rates (predicted clearing rates) based on theoretical characteristics of a contract that would be entered into at the end of the studied period. In particular, I distinguish between various asset classes, inclusion or not of intragroup trades, and the involvement of non-EEA counterparties. Credit derivatives which are not traded within a group are about five percentage points more likely to be centrally cleared if they involve a non-EEA counterparty. The effect is reverse and much stronger for interest rate derivatives. Interest rate derivative contracts which are not traded within a group are over twice more likely to be centrally cleared if they involve a non-EEA counterparty than if they are between two counterparties established within the EEA.

Hypothesis 5: financial nature of the counterparties

Financial companies should be better prepared to deal with counterparty risk and other risks related to having derivative contracts on the balance sheet than non-financial entities. However,

Table 12: Results for hypothesis 4 (full sample), estimated with a conditional probit model (Equation 6). The dependent binary variable denotes whether a contract is centrally cleared. Non-EEA cpty denotes whether the one of the counterparties to a contract has been established outside of the EEA. The full sample of all new derivative contracts is from April 2016 until June 2017.

	cleared (full sample)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
Non-EEA cpty	0.171***	−0.239***	−1.409***	−1.265***	−1.347***
	(0.005)	(0.002)	(0.008)	(0.005)	(0.001)
Constant	−3.306***	−1.071***	−2.418***	−2.490***	0.497***
	(0.017)	(0.005)	(0.006)	(0.008)	(0.002)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413
McFadden's R^2	0.203	0.018	0.148	0.146	0.186

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 13: Results for hypothesis 4 (extragroup), estimated with a conditional probit model (Equation 6). The dependent binary variable denotes whether a contract is centrally cleared. Non-EEA cpty denotes whether the one of the counterparties to a contract has been established outside of the EEA. The full sample of all new derivative contracts that are not between two entities within the same group is from April 2016 until June 2017.

	cleared (extragroup)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
Non-EEA cpty	0.196***	0.100***	−1.589***	−1.306***	−1.228***
	(0.005)	(0.003)	(0.008)	(0.005)	(0.001)
Constant	−3.298***	−1.190***	−2.295***	−2.446***	0.592***
	(0.017)	(0.005)	(0.007)	(0.008)	(0.003)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Observations	3,770,361	†	9,470,268	53,982,802	3,546,324
McFadden's R^2	0.209	0.031	0.198	0.153	0.156

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
†Not shown for reasons of confidentiality.

Table 14: Effect size for hypothesis 4 (full sample), with odds ratio of trade not being cleared given it is with a counterparty outside of the EEA (OR), Pearson's correlation coefficient between trade being cleared and it being with a counterparty outside of the EEA ($\rho(X, Y)$), partial correlation coefficient controlling for whether trade is within a group ($\rho(X, Y|Z)$), and mutual information (MI) and partial mutual information $MI(X, Y|Z)$ set up in the same way as the correlation coefficients.

	(CO)	(CR)	(EQ)	(FX)	(IR)
OR	0.619	1.499	93.885	41.595	9.068
$\rho(X, Y)$	0.020	−0.067	−0.089	−0.107	−0.492
$\rho(X, Y\|Z)$	0.024	0.033	−0.105	−0.109	−0.424
$MI(X, Y)$	0.000	0.002	0.004	0.007	0.128
$PMI(X, Y\|Z)$	0.000	0.000	0.005	0.007	0.088
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413
Notes:	All values significant at the 1 percent level.				

this can have various consequences. On the one hand, financial companies may be better placed to manage such risks in-house and thus be less willing to pay for central counterparties to manage these risks for them. On the other hand, financial counterparties may have an incentive to use central counterparties as they would understand the benefits of central clearing in terms of risk management and netting possibilities better due to their know-how. Here I provide an empirical analysis to answer this ambiguity.

To test the fifth hypothesis, which conjectures that trades with financial counterparties are more likely to be centrally cleared on a voluntary basis, I estimate the below equation using a conditional probit model, the choice of which is subject to robustness checks as presented in Tables 47-50:

$$Pr(\text{cleared}_i = 1) = \Phi(\alpha + \beta_1 \text{ financial nature}_i + \beta_2 \text{ Non-EEA cpty}_i + \gamma_t + \delta_j) + \epsilon_i \tag{7}$$

My hypothesis is confirmed if I find a statistically significant and positive coefficient of the dummy variable indicating the involvement of a financial counterparty β_1. I employ time fixed effects, which capture time trends, changes in reporting standards and the clearing obligation, and I saturate the model with counterparty type fixed effects[10] given the results of robustness checks as described in the annex. In the annex I also present checks for robustness w.r.t. various control variables, based on which only the variable indicating the involvement of a non-EEA counterparty has been included in this model.

[10]j index in the model runs across counterparty types: G16 dealers, other banks, insurance undertakings & pension funds, other financial institutions, and non-financial institutions.

I estimate the above equation for all trades for each asset class, and then separately for trades which are not intragroup, for the same reason as in the previous hypothesis.

As can be seen in Table 15, trades which involve a financial counterparty are more likely to be centrally cleared (with the exception of commodity derivatives). There are no major changes if I ignore intragroup trades, as shown in Table 16, except for the equity derivatives which then join commodity derivatives in being the exception. Finally, in Table 17 I present the effect size for the model testing the third hypothesis based on the full sample. As can be seen, the effect is not very strong. It is around twice as strong for the interest rate derivatives than it is for the credit derivatives, but if I account for the mediating influence of the intragroup trades the dependence is actually stronger for credit derivatives, but not by a large margin.

In Figure 10 I plot response rates (predicted clearing rates) based on theoretical characteristics of a contract that would be entered into at the end of the studied period. In particular, I distinguish between various asset classes, the involvement or not of financial counterparties, and the involvement of non-EEA counterparties, and the type of the reporting counterparty. The difference for the propensity for clearing between trades which involve a financial counterparty and ones which do not seems to be more pronounced for trades involving a non-EEA counterparty, but the probability of a trade being cleared is the highest if it involves a financial counterparty but is between two entities established within the EEA.

This is the first hypothesis in which I distinguish between various types of counterparties involved in the contract. Since the order of counterparty types in term of the probability of a trade being cleared given the specific type of counterparty being involved is more or less invariant to the other variables of interest in this model, it is useful to comment on it. This is not a general conclusion, as the model is not designed to study this particular issue and not to measure propensity for clearing based on the counterparty type, and within the next two hypotheses it will become apparent that it also depends on the setup of the model and the asset class in question. Nonetheless, within this model it turns out that trades involving other financial institutions (OFI) are the most likely ones to be cleared. Trades involving G16 dealers, insurance companies & pension funds are below OFIs, with banks lagging behind. Not unsurprisingly, non-financial institutions are the least likely to clear their contracts, which further confirms the findings of this part of the analysis. Importantly, showing that the propensity for clearing varies between various kinds of market participants, I confirm theoretical conjecture that incentives may differ between market participants of various kinds (Duffie et al., 2015). There is mixed evidence against the assertion of the Bank for International Settlements that incentives for clearing will differ across various types of institutions, with a distinction made between "risk-takers" (e.g. hedge funds) and "hedgers" (e.g. corporates, insurers and pension funds). While in the analysed model hedge funds (which are within OFIs) are on the opposite end of the spectrum than corporates, insurers and pension funds are quite close to OFIs (and thus hedge funds). It is noteworthy that this picture may be distorted by the classification not being granular enough, particularly for other financial institutions.

Table 15: Results for hypothesis 5 (full sample), estimated with a conditional probit model (Equation 7). The dependent binary variable denotes whether a contract is centrally cleared. financial nature denotes whether the reporting counterparty is of financial nature. I control for Non-EEA cpty, which denotes whether the one of the counterparties to a contract has been established outside of the EEA. The full sample of all new derivative contracts is from April 2016 until June 2017.

	cleared (full sample)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
financial nature	−0.422***	1.016***	0.391***	0.942***	1.071***
	(0.013)	(0.019)	(0.007)	(0.023)	(0.007)
Non-EEA cpty	0.283***	−0.212***	−1.863***	−1.381***	−1.421***
	(0.006)	(0.003)	(0.009)	(0.005)	(0.001)
Constant	−4.540***	−2.595***	−1.416***	−3.560***	−0.906***
	(0.031)	(0.021)	(0.010)	(0.025)	(0.007)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Type FE	Yes	Yes	Yes	Yes	Yes
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413
McFadden's R^2	0.428	0.027	0.506	0.196	0.211

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 16: Results for hypothesis 5 (extragroup), estimated with a conditional probit model (Equation 7). The dependent binary variable denotes whether a contract is centrally cleared. financial nature denotes whether the reporting counterparty is of financial nature. I control for Non-EEA cpty, which denotes whether the one of the counterparties to a contract has been established outside of the EEA. The full sample of all new derivative contracts that are not between two entities within the same group is from April 2016 until June 2017.

	cleared (extragroup)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
financial nature	−0.900***	1.170***	−0.891***	1.038***	0.798***
	(0.019)	(0.019)	(0.009)	(0.029)	(0.008)
Non-EEA cpty	0.605***	0.113***	−1.977***	−1.411***	−1.266***
	(0.008)	(0.003)	(0.009)	(0.006)	(0.002)
Constant	−4.479***	−2.967***	−0.014	−3.603***	−0.429***
	(0.034)	(0.022)	(0.013)	(0.030)	(0.009)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Type FE	Yes	Yes	Yes	Yes	Yes
Observations	3,770,361	†	9,470,268	53,982,802	3,546,324
McFadden's R^2	0.515	0.041	0.544	0.201	0.171

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
†Not shown for reasons of confidentiality.

Table 17: Effect size for hypothesis 5 (full sample), with odds ratio of trade being cleared given it is of financial nature (OR), Pearson's correlation coefficient between trade being cleared and it being of financial nature ($\rho(X,Y)$), partial correlation coefficient controlling for whether trade is within a group ($\rho(X,Y|Z)$), and mutual information (MI) and partial mutual information $MI(X,Y|Z)$ set up in the same way as the correlation coefficients.

	(CO)	(CR)	(EQ)	(FX)	(IR)
OR	0.202	6.221	1.598	27.800	3.601
$\rho(X,Y)$	−0.067	0.036	0.008	0.028	0.060
$\rho(X,Y\|Z)$	−0.089	0.051	0.007	0.022	0.044
$MI(X,Y)$	0.001	0.001	0.000	0.001	0.002
$MI(X,Y\|Z)$	0.003	0.001	0.000	0.001	0.001
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413
Notes:	All values significant at the 1 percent level.				

Hypothesis 6: the size of previous trading activity

Above I have discussed how company being a financial entity may affect its propensity to use central clearing. However, a company being of financial nature is a very broad concept. The sophistication of financial companies with regards to their understanding of derivatives markets may vary significantly. It may be more useful to gauge each company's sophistication by some proxy, such as the total notional traded by that company in the previous month. The idea is that a company which trades a lot of derivatives should understand the market much better than a company which does not trade at all or only in a very limited capacity. Then, much in line with the arguments in the previous hypothesis, a counterparty used to trading high volumes of derivatives is more likely to be able to manage counterparty risk in-house but also more likely to understand the benefits of central clearing. Further, a counterparty which trades a substantial amount on the market may reap greater benefits from netting of margins stemming from the use of central clearing. Finally, as mentioned in the literature review, major derivatives market participants may be more likely to clear their trades, being forced to do so by other participants to increase their creditworthiness, due to the structure of the cleared market (Ghamami and Glasserman, 2017). Thus, there may be incentive to move towards central clearing if the trading activity of a company grows.

To test the sixth hypothesis, which conjectures that trades with counterparties who have traded larger volumes in the preceding month are more likely to be centrally cleared on a voluntary basis, I estimate the below equation using a conditional probit model, the choice of which is subject to robustness checks as presented in Tables 51-58:

$$Pr(\text{cleared}_i = 1) = \Phi(\alpha + \beta_1 \log(\text{prev.notional})_i + \gamma_t + \delta_j) + \epsilon_i \quad (8)$$

My hypothesis is confirmed if I find a statistically significant and positive coefficient of the logarithm of the notional traded by the reporting counterparty in the previous month β_1. I employ time fixed effects, which capture time trends, changes in reporting standards and the clearing obligation, and I saturate the model with counterparty type fixed effects given the results of robustness checks as described in the annex. In the annex I also present checks for robustness w.r.t. various control variables, based on which no control variables have been included in this model. I use the notional value in logarithm, in line with the standard practice in financial economics. Please note that for this hypothesis I also perform robustness checks for a model with the number of trades instead of the volume of trades entered into by the reporting counterparty in the previous month. As expected, results are more interesting and insightful when I use the notional instead of the number of trades, thus I do not report on the model with the number of trades.

I estimate the above equation for all trades for each asset class, and then separately for trades which are not intragroup, for the same reason as in the previous hypothesis.

As can be seen in Table 18, trades which involve a counterparty that has traded larger volume of derivatives within the same asset class in the previous month are more likely to be centrally cleared for interest rate and foreign exchange contracts, but less likely to be centrally cleared for commodity, credit, and equity contracts. If I ignore intragroup trades, these effects become stronger for commodity, foreign exchange, and interest rate contracts, and for credit derivatives the relationship changes its sign, as shown in Table 19. Thus, it appears that there are also economies of scale related to clearing credit and interest rate derivatives stemming from the scale of operations within the derivatives market of the reporting counterparty. Finally, in Table 20 I present the effect size for the model testing the third hypothesis based on the full sample. As can be seen, this effect is not very strong, although significant. Moreover, this is a good example of why a correlation study would not be enough. For interest rate derivatives the correlation is negative, even though from Table 18 one can see that the relationship is positive.

In Figures 11-15 I plot response rates (predicted clearing rates) based on theoretical characteristics of a contract that would be entered into at the end of the studied period. In particular, I distinguish between various asset classes, the volume of derivatives traded in the previous month by the reporting counterparty, the inclusion or not of intragroup trades, and the type of the reporting counterparty. For interest rate derivatives there is a linear relationship between previously traded notional and the probability of a trade being cleared, whether I include intragroup trades or not. Interestingly, OFIs are the most likely to clear their contracts in this setting, followed by insurance companies and pension funds, banks, G16 dealers, with non-financial institutions in the last place. This relationship is linear as well for credit derivatives, but it is negative when I include intragroup trades and positive when I only look at trades between counterparties from different groups. Of note, this relationship is strongly non-linear for foreign exchange derivatives. For equity derivatives only contracts entered into by banks are likely to be centrally cleared. As in the previous hypothesis, the evidence is mixed against a distinction made between "risk-takers" (e.g. hedge funds) and "hedgers" (e.g. corporates, insurers and pension funds) (Bank for International Settlements, 2014).

Table 18: Results for hypothesis 6 (full sample), estimated with a conditional probit model (Equation 8). The dependent binary variable denotes whether a contract is centrally cleared. log(prev.notional) denotes the total gross notional traded by the reporting counterparty within the same asset class in the previous month. The full sample of all new derivative contracts is from April 2016 until June 2017.

	cleared (full sample)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
log(prev.notional)	-0.029^{***}	-0.028^{***}	-0.123^{***}	0.378^{***}	0.015^{***}
	(0.000)	(0.000)	(0.001)	(0.002)	(0.000)
Constant	-4.824^{***}	-1.033^{***}	0.596^{***}	-4.895^{***}	-0.407^{***}
	(0.029)	(0.013)	(0.013)	(0.017)	(0.006)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Type FE	Yes	Yes	Yes	Yes	Yes
Observations	4,296,374	1,814,047	12,320,166	4,162,367	4,231,413
McFadden's R^2	0.431	0.022	0.453	0.239	0.020
Notes:	***Significant at the 1 percent level.				
	**Significant at the 5 percent level.				
	*Significant at the 10 percent level.				

Hypothesis 7: the size of previous clearing activity

In the previous hypothesis I have looked at the volume of contracts traded by the reporting counterparty in the previous month. This proxies well for the sophistication and understanding of the derivatives markets by the counterparties. It may not be the best proxy for the benefits that come from the economies of scale within central clearing, for instance netting possibilities. Central clearing can either improve or reduce netting opportunities, depending on how much is cleared (Duffie et al., 2015), thus a better proxy for this may be the volume of centrally cleared contracts by the reporting counterparty in the previous month. I test whether previous volume of cleared trades is a good indicator of whether new trades of a counterparty are likely to be centrally cleared.

To test the seventh hypothesis, which conjectures that trades with counterparties who have cleared larger volumes in the preceding month are more likely to be centrally cleared on a voluntary basis, I estimate the below equation using a conditional probit model, the choice of which is subject to robustness checks as presented in Tables 59-66:

Table 19: Results for hypothesis 6 (extragroup), estimated with a conditional probit model (Equation 8). The dependent binary variable denotes whether a contract is centrally cleared. log(prev.notional) denotes the total gross notional traded by the reporting counterparty within the same asset class in the previous month. The full sample of all new derivative contracts that are not between two entities within the same group is from April 2016 until June 2017.

	cleared (extragroup)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
log(prev.notional)	-0.088^{***}	0.041^{***}	-0.123^{***}	0.395^{***}	0.047^{***}
	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)
Constant	-5.098^{***}	-2.731^{***}	0.609^{***}	-4.985^{***}	-1.046^{***}
	(0.030)	(0.018)	(0.014)	(0.017)	(0.007)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Type FE	Yes	Yes	Yes	Yes	Yes
Observations	3,770,361	†	9,470,268	3,687,931	3,546,324
McFadden's R^2	0.544	0.039	0.444	0.248	0.023
Notes:	***Significant at the 1 percent level.				
	**Significant at the 5 percent level.				
	*Significant at the 10 percent level.				
	†Not shown for reasons of confidentiality.				

Table 20: Effect size for hypothesis 6 (full sample), with Pearson's correlation coefficient between trade being cleared and it total gross notional traded by reporting counterparty within the previous month ($\rho(X,Y)$), and partial correlation coefficient controlling for whether trade is within a group ($\rho(X,Y|Z)$).

	(CO)	(CR)	(EQ)	(FX)	(IR)
$\rho(X,Y)$	−0.046	−0.060	−0.093	0.155	−0.029
$\rho(X,Y\|Z)$	−0.048	0.035	−0.090	0.155	0.024
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413
Notes:	All values significant at the 1 percent level.				

Table 21: Results for hypothesis 7 (full sample), estimated with a conditional probit model (Equation 9). The dependent binary variable denotes whether a contract is centrally cleared. log(prev.not.cleared) denotes the total gross notional cleared by the reporting counterparty within the same asset class in the previous month. The full sample of all new derivative contracts is from April 2016 until June 2017.

	cleared (full sample)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
log(prev.not.cleared)	0.292***	0.144***	0.400***	0.071***	0.080***
	(0.002)	(0.001)	(0.003)	(0.000)	(0.000)
Constant	−3.871***	−4.515***	−4.711***	−3.968***	−1.923***
	(0.034)	(0.018)	(0.077)	(0.011)	(0.005)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Type FE	Yes	Yes	Yes	Yes	Yes
Observations	4,296,374	1,814,047	12,320,166	4,162,367	4,231,413
McFadden's R^2	0.873	0.110	0.990	0.173	0.060
Notes:	***Significant at the 1 percent level.				
	**Significant at the 5 percent level.				
	*Significant at the 10 percent level.				

$$Pr(\text{cleared}_i = 1) = \Phi(\alpha + \beta_1 \log(\text{prev.not.cleared})_i + \gamma_t + \delta_j) + \epsilon_i \tag{9}$$

My hypothesis is confirmed if I find a statistically significant and positive coefficient of the logarithm of the notional cleared by the reporting counterparty in the previous month β_1. I employ time fixed effects, which capture time trends, changes in reporting standards and the clearing obligation, and I saturate the model with counterparty type fixed effects given the results of robustness checks as described in the annex. In the annex I also present checks for robustness w.r.t. various control variables, based on which no control variables have been included in this model. I use the notional value in logarithm, in line with the standard practice in financial economics. Similar to the previous hypothesis, I also perform a robustness check for a model with the number of cleared trades being used instead of the volume of cleared trades. As expected, results are more interesting and meaningful when the notional values are used.

I estimate the above equation for all trades for each asset class, and then separately for trades which are not intragroup, for the same reason as in the previous hypothesis.

As can be seen in Table 21, the picture is very clear. Trades which involve a counterparty that has cleared larger volume of derivatives within the same asset class in the previous month are more likely to be centrally cleared for all asset classes. If I ignore intragroup trades, the picture stays the same, as shown in Table 22. Finally, in Table 23 I present the effect size for the model testing

Table 22: Results for hypothesis 7 (extragroup), estimated with a conditional probit model (Equation 9). The dependent binary variable denotes whether a contract is centrally cleared. log(prev.not.cleared) denotes the total gross notional cleared by the reporting counterparty within the same asset class in the previous month. The full sample of all new derivative contracts that are not between two entities within the same group is from April 2016 until June 2017.

	cleared (extragroup)				
	(CO)	(CR)	(EQ)	(FX)	(IR)
log(prev.not.cleared)	0.289***	0.110***	0.396***	0.071***	0.072***
	(0.002)	(0.000)	(0.003)	(0.000)	(0.000)
Constant	−3.946***	−3.907***	−4.652***	−3.935***	−1.593***
	(0.035)	(0.015)	(0.076)	(0.011)	(0.006)
Monthly FE	Yes	Yes	Yes	Yes	Yes
Type FE	Yes	Yes	Yes	Yes	Yes
Observations	3,770,361	†	9,470,268	3,687,931	3,546,324
McFadden's R^2	0.885	0.119	0.990	0.177	0.049

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
†Not shown for reasons of confidentiality.

Table 23: Effect size for hypothesis 7 (full sample), with Pearson's correlation coefficient between trade being cleared and it total gross notional centrally cleared by reporting counterparty within the previous month ($\rho(X,Y)$), and partial correlation coefficient controlling for whether trade is within a group ($\rho(X,Y|Z)$).

	(CO)	(CR)	(EQ)	(FX)	(IR)
$\rho(X,Y)$	0.862	0.141	0.994	0.128	0.127
$\rho(X,Y\|Z)$	0.862	0.182	0.994	0.128	0.107
Observations	4,296,374	1,814,047	12,320,166	60,627,185	4,231,413

Notes: All values significant at the 1 percent level.

the third hypothesis based on the full sample. The effect is reasonably strong for both credit and interest rate derivatives. It is exceedingly strong for commodity and equity derivatives, but it is a consequence of a very small and concentrated part of these markets that uses central clearing. To sum up, my research hints at there being significant economies of scale involved in central clearing of derivative contracts.

In Figures 16-20 I plot response rates (predicted clearing rates) based on theoretical characteristics of a contract that would be entered into at the end of the studied period. In particular, I distinguish between various asset classes, the volume of derivatives cleared in the previous month by the reporting counterparty, the inclusion or not of intragroup trades, and the type of the reporting counterparty. For interest rate derivatives there is a linear relationship between previously cleared notional and the probability of a trade being cleared, whether I include intragroup trades or not. The probabilities of trade being cleared varies significantly depending on the type of reporting counterparty. For credit derivatives the picture is the same, except the relationship is further away from being linear. Once again, results for commodity and equity derivatives are not trustworthy in this setup, as they stem from the particular structure of these markets with regards to central clearing. Bank for International Settlements noted that clearing member banks have incentives to clear centrally, but central clearing incentives for market participants that clear indirectly are reported to be less obvious (Bank for International Settlements, 2014). This does not appear to be the case based on the results. In fact, for both credit derivatives and interest rate derivatives banks and dealers are the least likely to clear their contracts on a voluntary basis.

6. Conclusions

I have shown the state of central clearing of derivative contracts in the European Union. I have shown the clearing rates in all five major asset classes of derivatives between March 2016 and June 2017. Only credit and interest rate derivatives have a significant involvement of central counterparties. Further, the clearing rates for these two asset classes are relatively stable across the studied period. These results stem, to a large extent, from the legal obligation to clear certain credit and interest rate derivative contracts. This legal obligation has not been detailed carefully in this paper, but can be easily found in the legal text of the European Union and the documents released by the ESMA. There is part of central clearing not stemming from the legal obligation but rather from voluntary clearing of derivative contracts above and beyond the clearing obligation. I shed light on theoretical literature on central clearing of derivative contracts and inform policymakers in their deliberations on clearing obligation by investigating the determinants of voluntary clearing. I have shown some of the characteristics of the derivative contracts which are associated with higher likelihood of these contracts being centrally cleared, and thus indirectly driving forces behind the central clearing of derivatives. In particular, I have shown that there are economies of scale related to the central clearing of derivatives, which is in line with the market intelligence gathered when performing this study. This is useful for policy makers as it affects the incentives which need to be taken into account when deciding on the future shape of the clearing obligation within the European Union. In particular, it seems that broadening the scope of the clearing obligation could bring additional benefits in terms of costs of clearing, in addition to other benefits such as better financial stability and better market transparency. I have also shown that intragroup trades are barely cleared, in line with the expectations. Large notional value of the contract has a positive effect on the probability of such contract being centrally cleared regardless of the asset class. This is also useful information for policy makers with respect to thresholds for counterparties who are subject to the clearing obligation. Interestingly, there is an unambiguous relation between the probability a trade will be centrally cleared and the involvement of non-EEA counterparties, and maturity. These need to be treated with care on an asset class level. Further studies should look in more detail into specific asset classes and contract types of interest to the literature and for which an extension or amendment of clearing obligation may be desired. Future studies looking into specific parts of the market should also distinguish between OTC and exchange-traded derivatives, merge the EMIR data with market data, and distinguish between contracts which should in principle satisfy the CCP eligibility for clearing criteria. Finally, the sample length did not allow this study to incorporate the period after exchange of variation margin for bilateral trades entered into force, thus further studies should take a look at the period after this change.

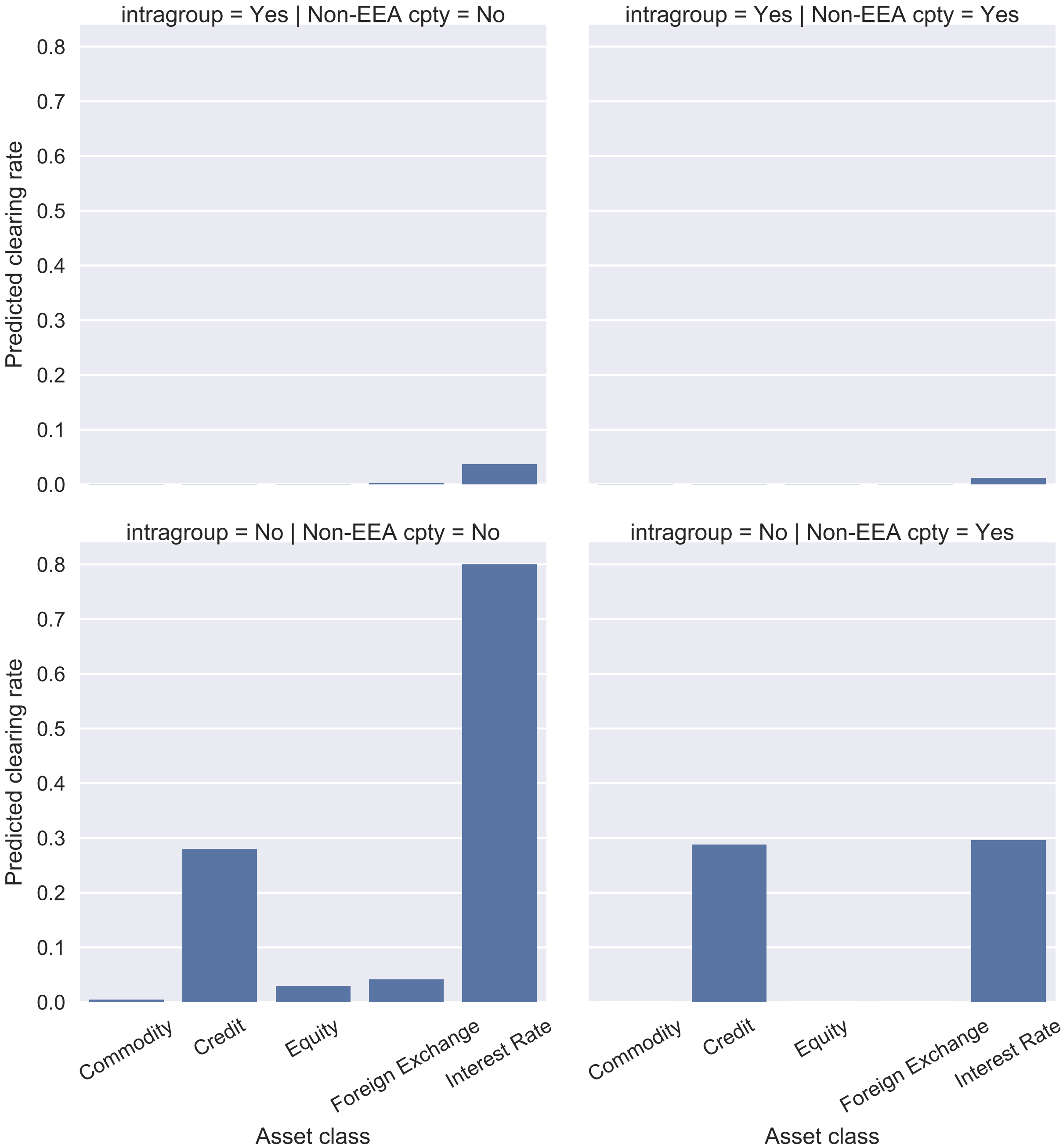

Fig. 6. Predicted clearing rates based on the models reported in Tables 3-4, accounting for whether a trade is within a group or not and whether one of the counterparties is located outside of the EEA, for trade that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values.

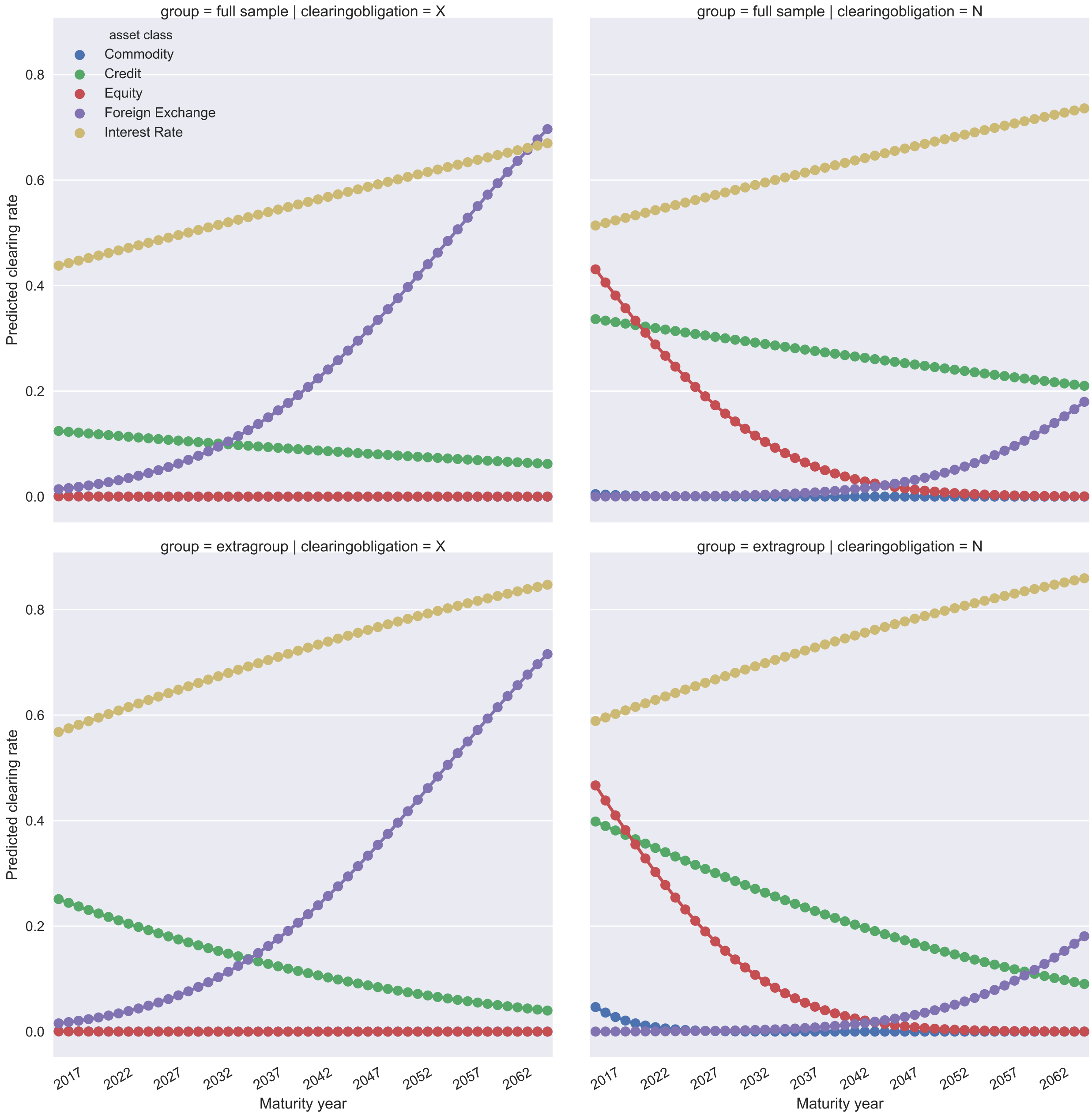

Fig. 7. Predicted clearing rates based on the model reported in Tables 6-7, accounting for whether a trade is within a group and whether there is a delayed clearing obligation, as well as the year of maturity, for trade that would be executed at the end of the studied period (June 2017) of median value for each asset class. Standard errors are not presented as they are ~ 0 for all values.

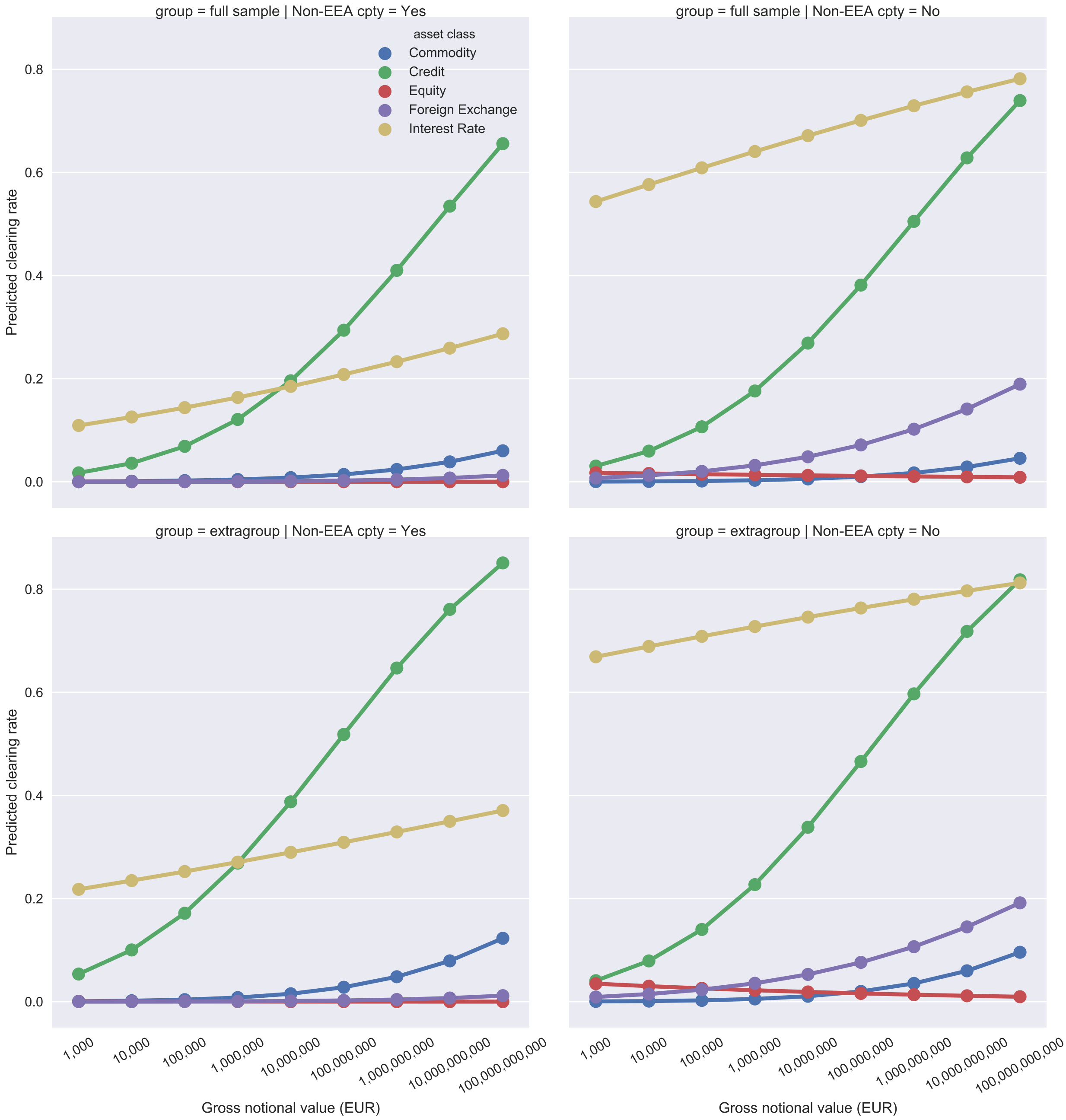

Fig. 8. Predicted clearing rates based on the model reported in Tables 9-10, accounting for whether a trade is within a group and whether it is with a counterparty outside of the EEA, as well as the gross notional of the trade (in EUR), for a trade that would be executed at the end of the studied period (June 2017), with a short-term maturity (representative for most contracts in the market). Standard errors are not presented as they are ~ 0 for all values (with a maximum standard error of around 0.001).

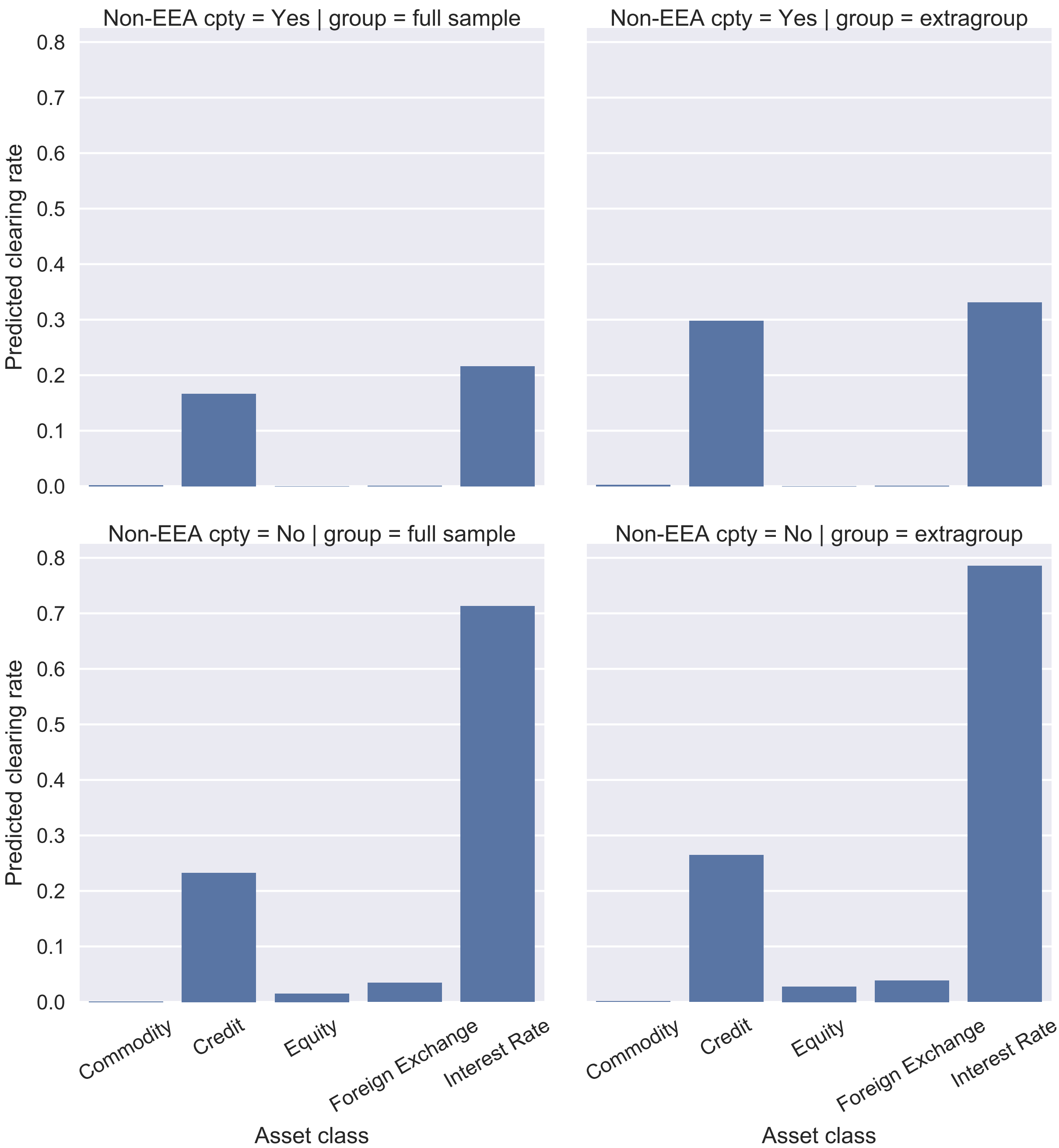

Fig. 9. Predicted clearing rates based on the model reported in Tables 12-13, accounting for whether a trade is within a group, and whether it is with a counterparty outside of the EEA, for trade that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (with a maximum standard error of around 0.002).

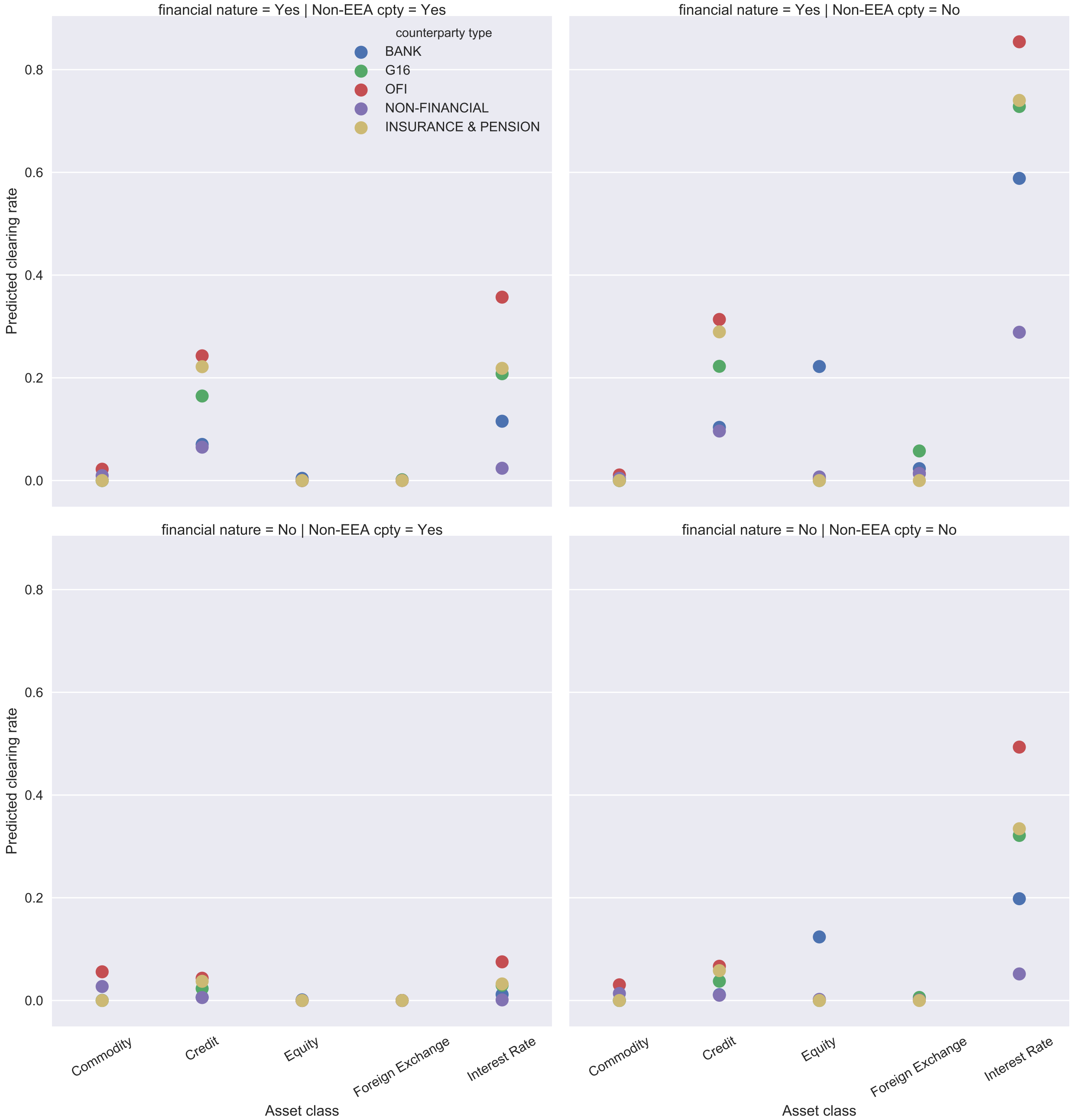

Fig. 10. Predicted clearing rates based on the model reported in Table 15, accounting for whether a trade is of financial nature and whether it is with a counterparty outside of the EEA, for trade that is not within a group, and is executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (with a maximum standard error of around 0.018).

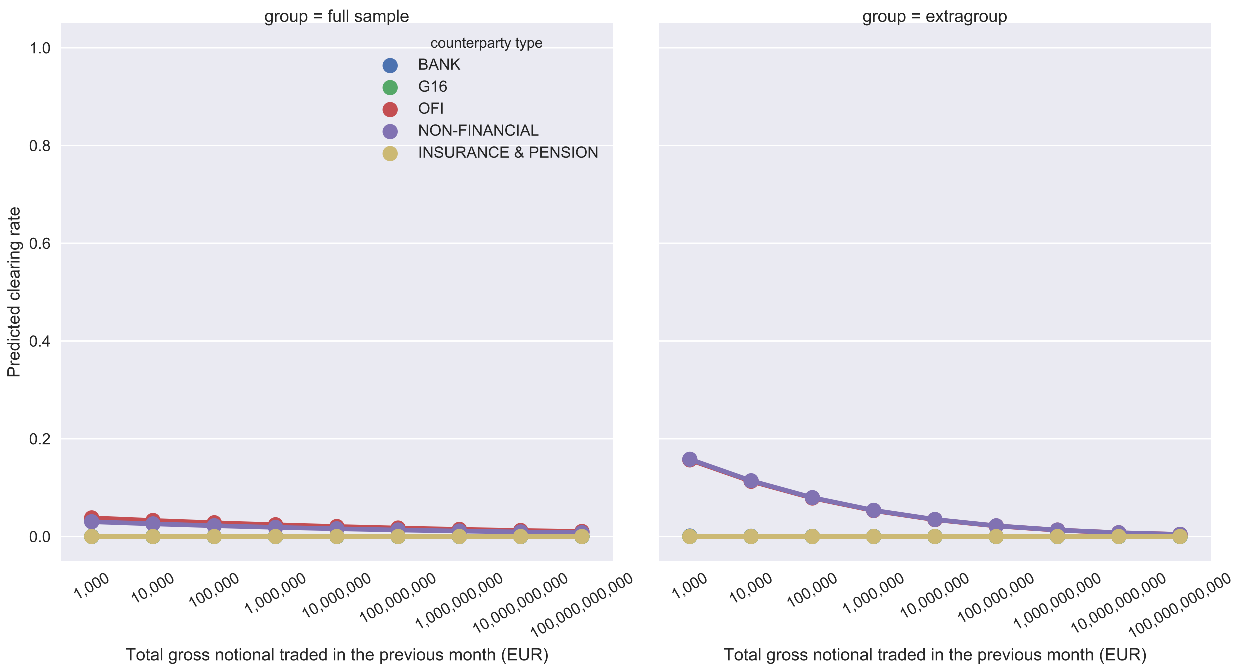

Fig. 11. Predicted clearing rates based on the model reported in Tables 18-19, accounting for whether a trade is within a group, the type of the counterparty, and the total gross notional traded by the reporting counterparty in the previous month, for a commodity derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

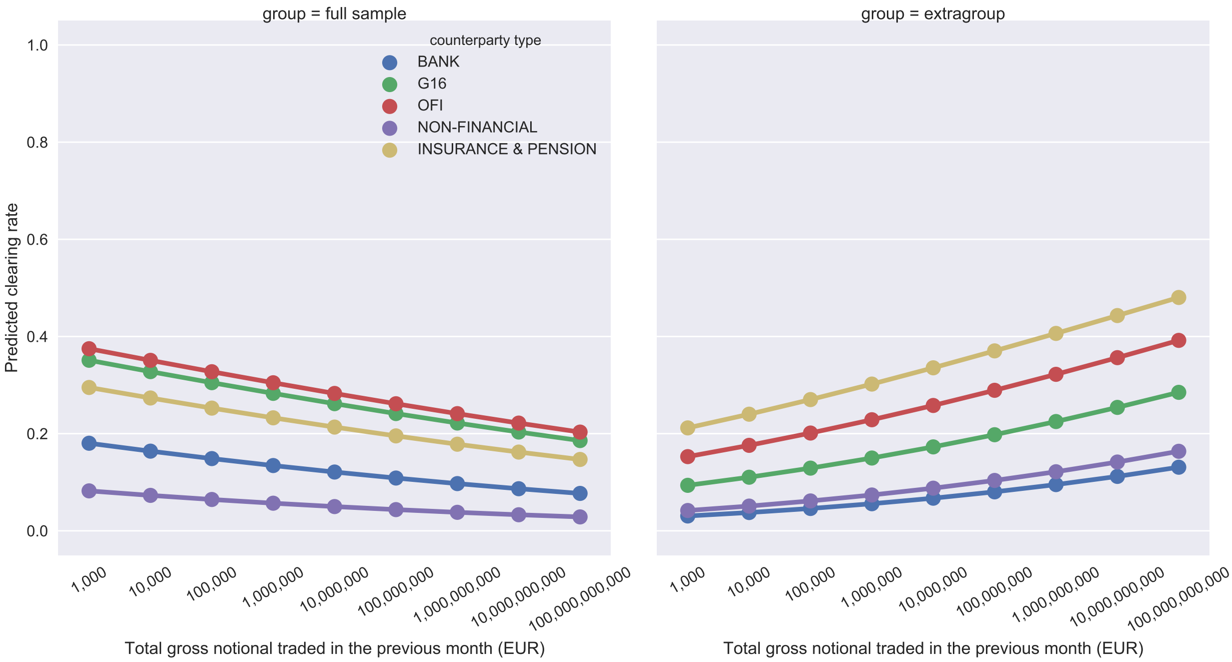

Fig. 12. Predicted clearing rates based on the model reported in Tables 18-19, accounting for whether a trade is within a group, the type of the counterparty, and the total gross notional traded by the reporting counterparty in the previous month, for a credit derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

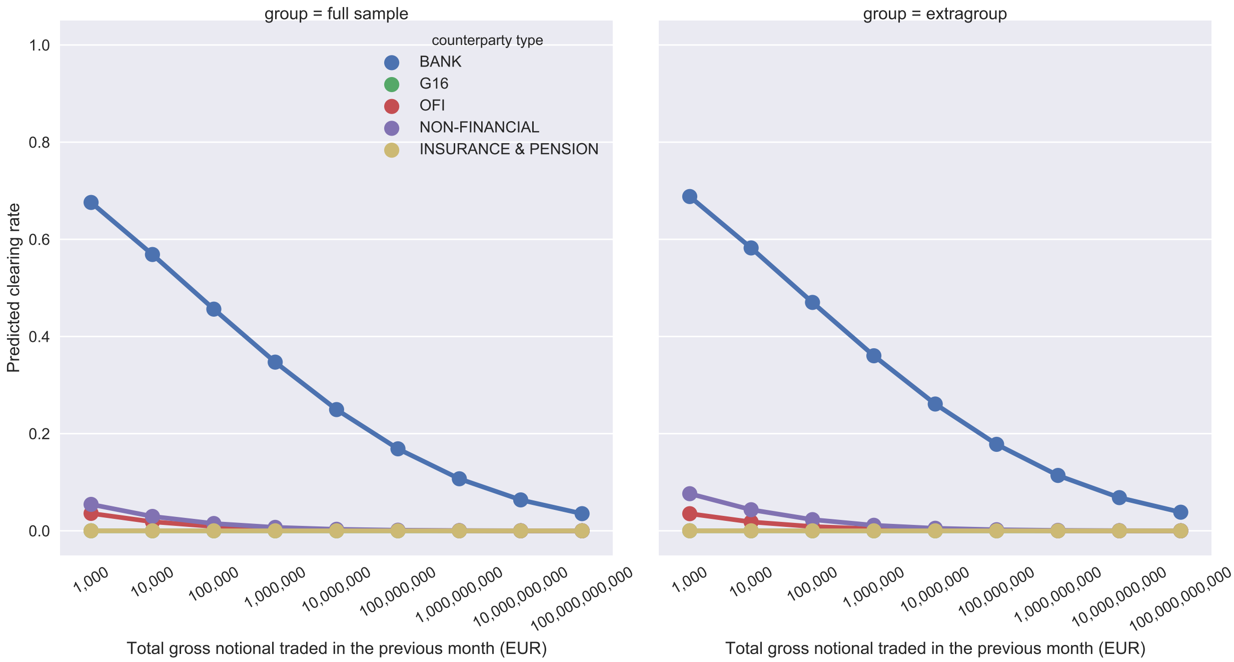

Fig. 13. Predicted clearing rates based on the model reported in Tables 18-19, accounting for whether a trade is within a group, the type of the counterparty, and the total gross notional traded by the reporting counterparty in the previous month, for an equity derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

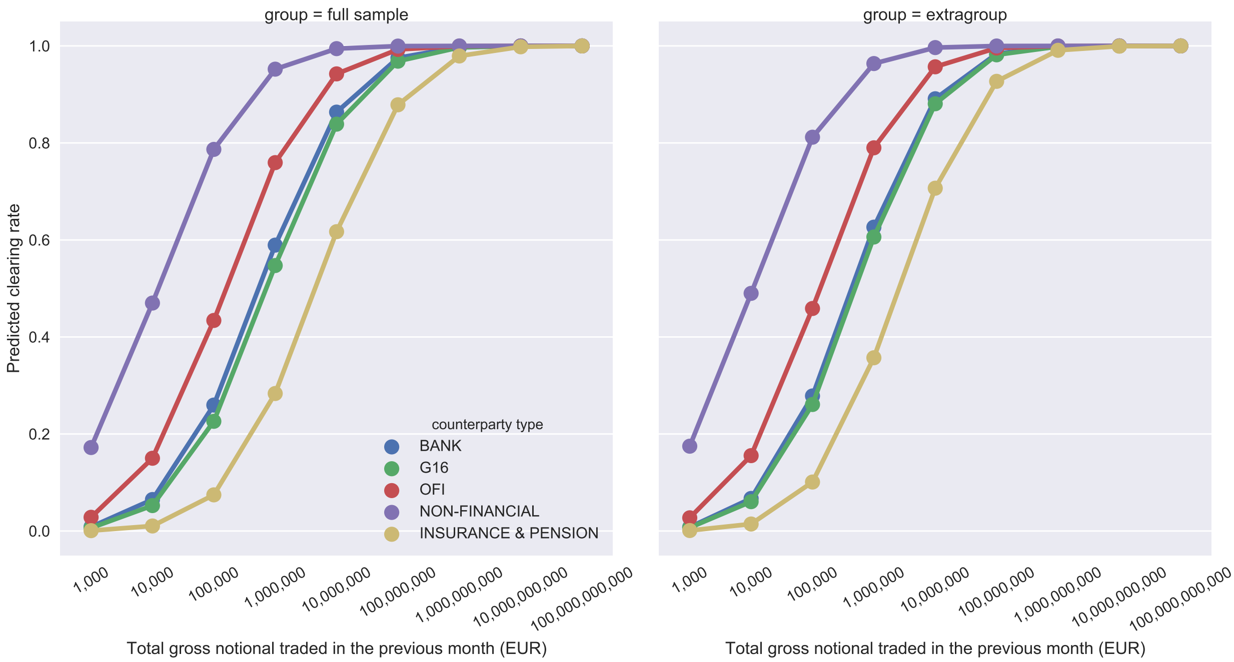

Fig. 14. Predicted clearing rates based on the model reported in Tables 18-19, accounting for whether a trade is within a group, the type of the counterparty, and the total gross notional traded by the reporting counterparty in the previous month, for a foreign exchange derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

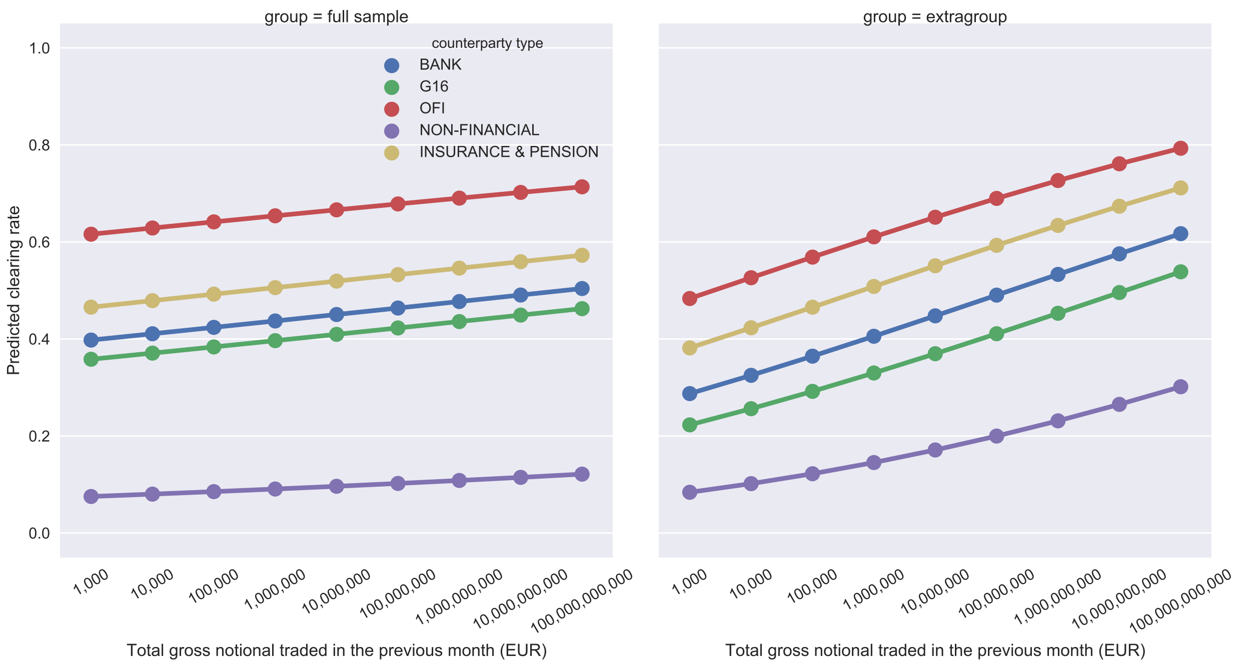

Fig. 15. Predicted clearing rates based on the model reported in Tables 18-19, accounting for whether a trade is within a group, the type of the counterparty, and the total gross notional traded by the reporting counterparty in the previous month, for an interest rate derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

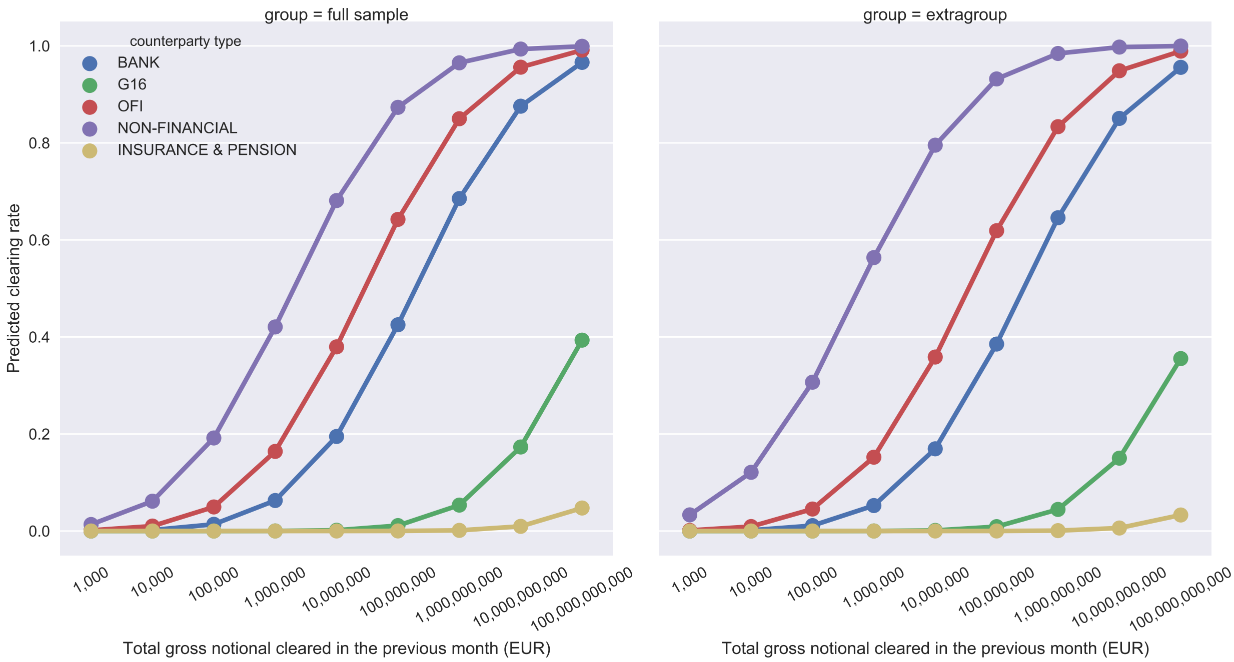

Fig. 16. Predicted clearing rates based on the model reported in Tables 21-22, accounting for whether a trades is within a group, the type of the counterparty, and the total gross notional of trades centrally cleared by the reporting counterparty in the previous month, for a commodity derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

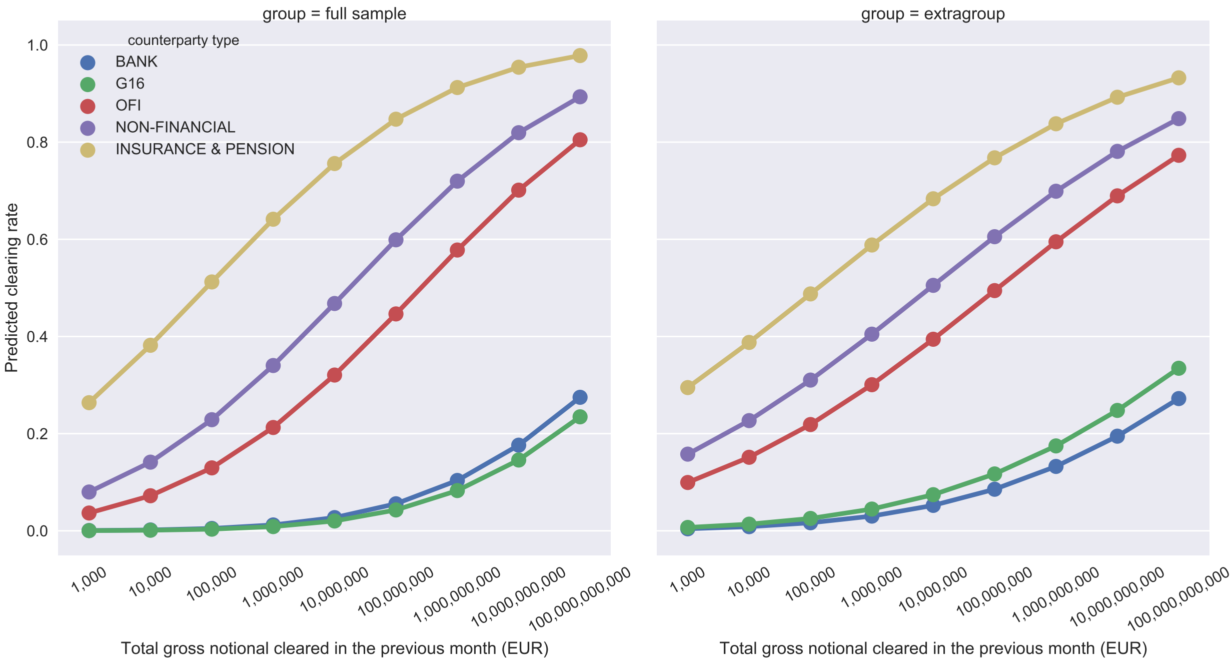

Fig. 17. Predicted clearing rates based on the model reported in Tables 21-22, accounting for whether a trades is within a group, the type of the counterparty, and the total gross notional of trades centrally cleared by the reporting counterparty in the previous month, for a credit derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

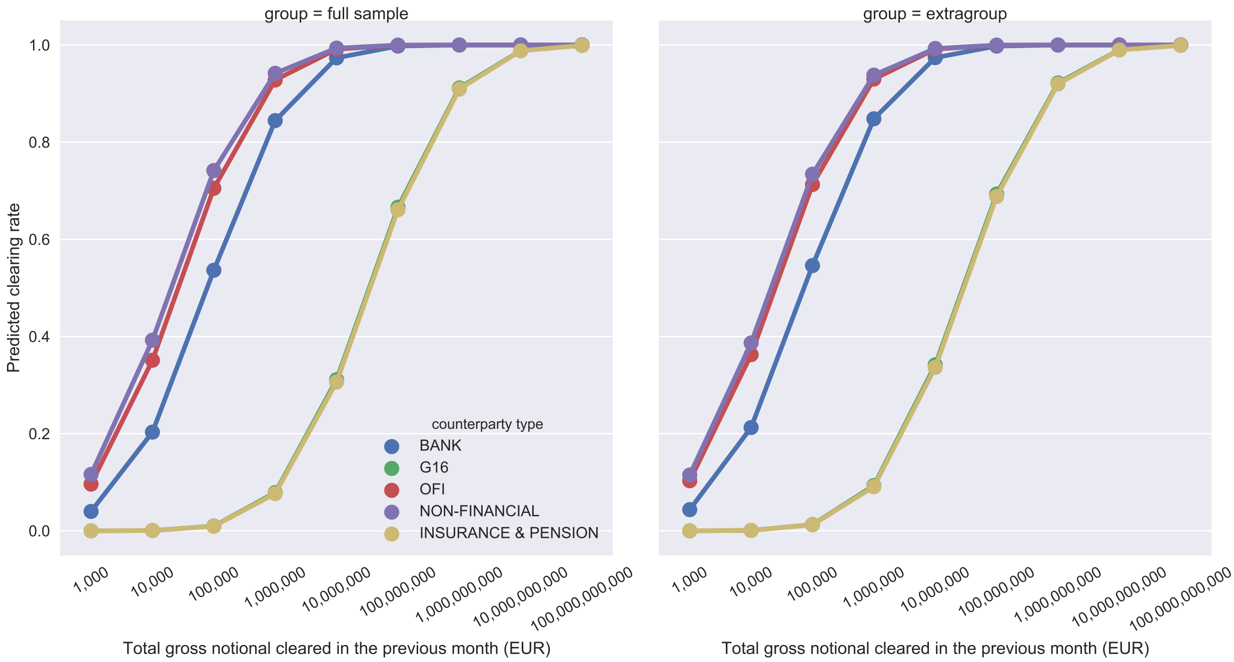

Fig. 18. Predicted clearing rates based on the model reported in Tables 21-22, accounting for whether a trades is within a group, the type of the counterparty, and the total gross notional of trades centrally cleared by the reporting counterparty in the previous month, for an equity derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

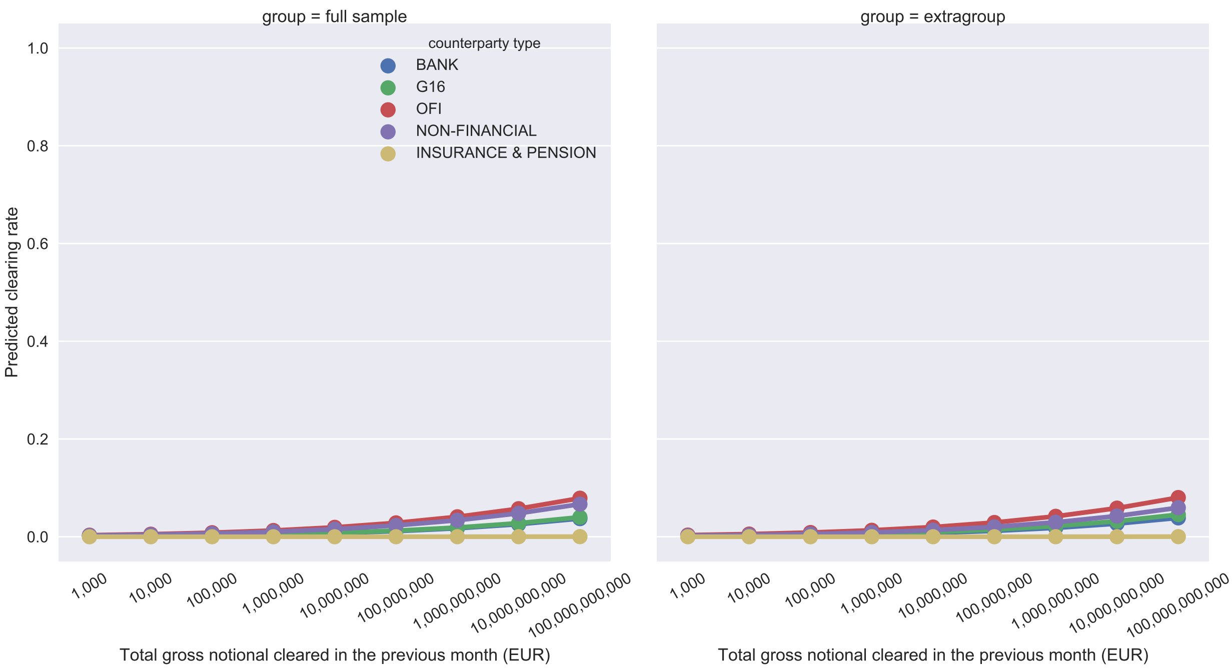

Fig. 19. Predicted clearing rates based on the model reported in Tables 21-22, accounting for whether a trades is within a group, the type of the counterparty, and the total gross notional of trades centrally cleared by the reporting counterparty in the previous month, for a foreign exchange derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

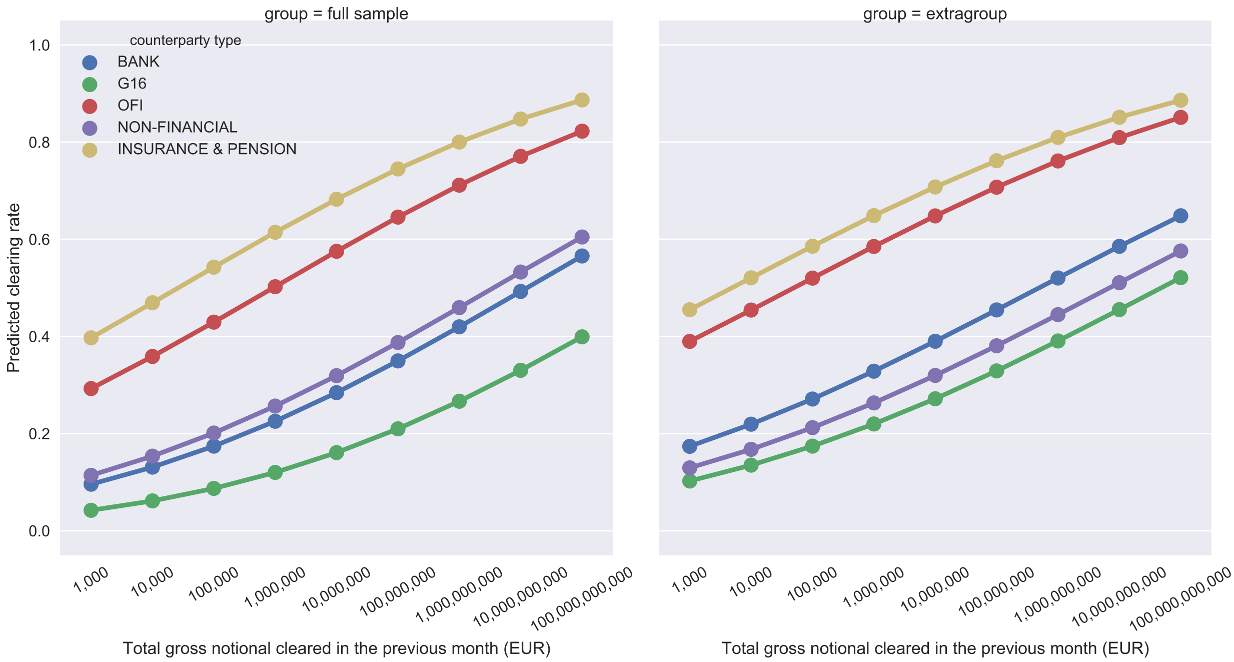

Fig. 20. Predicted clearing rates based on the model reported in Tables 21-22, accounting for whether a trades is within a group, the type of the counterparty, and the total gross notional of trades centrally cleared by the reporting counterparty in the previous month, for an interest rate derivative contract that would be executed at the end of the studied period (June 2017). Standard errors are not presented as they are ~ 0 for all values (except for insurers & pension funds for which results should be interpreted with caution).

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Appendix A. Summary statistics & robustness checks

Table 24: Summary statistics for binary dependent variables.

Variable	Value	(CO)	(CR)	(EQ)	(FX)	(IR)
intragroup	1	526,013	†	2,849,898	6,644,383	685,089
	0	3,770,361	†	9,470,268	53,982,802	3,546,324
financial nature	1	3,927,673	1,792,267	10,925,735	56,376,331	4,180,527
	0	368,701	21,780	1,394,431	4,250,854	50,886
tradingcapacity	1	†	1,810,076	12,203,917	59,166,656	4,222,891
	0	†	3,971	116,249	1,460,529	8,522
Non-EEA cpty	1	1,732,703	1,253,452	7,939,029	32,498,471	1,893,030
	0	2,563,671	560,595	4,381,137	28,128,714	2,338,383
clearingobligation	1	4,144,755	1,507,384	11,624,839	57,089,343	2,657,499
	0	151,619	306,663	695,327	3,537,842	1,573,914

Notes: Items not shown due to reasons of confidentiality:
†Split in line with other asset classes.

Table 25: Summary statistics for non-binary dependent variables.

Variable	Asset class	Quantile				
		10	25	50	75	90
eurnotional	Commodity	390	1,191	11,147	89,644	498,155
	Credit	240,000	1,000,000	4,000,000	10,000,000	26,893,200
	Equity	814	4,744	25,381	180,793	1,212,000
	Foreign Exchange	6,300	58,440	460,404	3,804,818	24,763,500
	Interest Rate	869,327	4,994,410	22,000,000	71,765,850	210,000,000
maturityyear	Commodity	2016	2016	2016	2017	2017
	Credit	2017	2018	2021	2021	2022
	Equity	2016	2017	2018	2018	2026
	Foreign Exchange	2016	2016	2016	2017	2017
	Interest Rate	2017	2018	2022	2027	2037
prev.trades	Commodity	†	1,861	71,563	134,606	148,053
	Credit	732	5,539	11,208	21,945	40,800
	Equity	2,140	11,254	49,503	95,719	111,244
	Foreign Exchange	293	10,371	122,234	245,094	384,705
	Interest Rate	428	7,087	17,895	30,391	36,176
prev.notional	Commodity	†	765,990,320	26,539,867,766	35,097,782,453	43,127,571,320
	Credit	10,653,713,281	82,224,345,963	175,963,419,834	374,107,228,884	641,876,287,530
	Equity	204,185,616	2,548,732,854	107,694,497,226	408,931,765,221	2,074,413,637,504
	Foreign Exchange	464,118,439	33,508,919,462	2,402,324,084,719	5,047,248,185,287	7,014,473,051,717
	Interest Rate	28,105,286,456	794,200,504,719	2,551,685,906,015	4,970,887,422,999	7,116,249,271,385
prev.trades.c	Commodity	†	†	†	†	†
	Credit	†	180	477	1,526	4,099
	Equity	†	†	†	†	†
	Foreign Exchange	†	†	†	1,371	3,886
	Interest Rate	244	3,888	8,128	11,566	14,916
prev.not.c	Commodity	†	†	†	†	†
	Credit	10,500,000	4,403,150,000	14,476,832,613	36,407,707,591	76,187,483,922
	Equity	†	†	†	†	†
	Foreign Exchange	†	†	†	9,687,848,327	34,366,603,755
	Interest Rate	8,581,369,739	427,772,030,604	1,040,257,258,695	1,824,173,176,571	2,859,015,655,784

Notes: Items not shown due to reasons of confidentiality:
†Not shown due to low values.

Table 26: Pearson's correlation coefficients between dependent variables, for Commodity derivatives. Variables are: (1) intragroup, (2) financial nature, (3) tradingcapacity, (4) Non-EEA cpty, (5) clearing obligation, (6) maturityyear, (7) eurnotional, (8) prev.notional, (9) prev.not.cleared.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	1.000	−0.432	−0.171	0.125	−0.332	0.013	0.000	0.012	−0.023
(2)	−0.432	1.000	−0.024	0.113	0.431	−0.007	−0.001	0.045	−0.008
(3)	−0.171	−0.024	1.000	−0.043	0.380	−0.014	0.000	0.016	0.007
(4)	0.125	0.113	−0.043	1.000	0.029	0.029	0.000	0.067	0.035
(5)	−0.332	0.431	0.380	0.029	1.000	−0.158	0.000	0.028	−0.016
(6)	0.013	−0.007	−0.014	0.029	−0.158	1.000	0.000	−0.003	−0.010
(7)	0.000	−0.001	0.000	0.000	0.000	0.000	1.000	0.005	0.000
(8)	0.012	0.045	0.016	0.067	0.028	−0.003	0.005	1.000	−0.009
(9)	−0.023	−0.008	0.007	0.035	−0.016	−0.010	0.000	−0.009	1.000

Table 27: Pearson's correlation coefficients between dependent variables, for Credit derivatives. Variables are: (1) intragroup, (2) financial nature, (3) tradingcapacity, (4) Non-EEA cpty, (5) clearing obligation, (6) maturityyear, (7) eurnotional, (8) prev.notional, (9) prev.not.cleared.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	1.000	0.057	0.029	0.398	0.193	−0.206	0.001	0.249	−0.286
(2)	0.057	1.000	−0.002	−0.042	−0.046	0.003	0.000	0.018	0.085
(3)	0.029	−0.002	1.000	0.049	0.014	0.000	0.000	0.008	0.025
(4)	0.398	−0.042	0.049	1.000	0.053	−0.004	0.000	0.100	−0.002
(5)	0.193	−0.046	0.014	0.053	1.000	−0.153	0.000	0.066	−0.214
(6)	−0.206	0.003	0.000	−0.004	−0.153	1.000	0.000	−0.054	0.147
(7)	0.001	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
(8)	0.249	0.018	0.008	0.100	0.066	−0.054	0.000	1.000	−0.053
(9)	−0.286	0.085	0.025	−0.002	−0.214	0.147	0.000	−0.053	1.000

Table 28: Pearson's correlation coefficients between dependent variables, for Equity derivatives. Variables are: (1) intragroup, (2) financial nature, (3) tradingcapacity, (4) Non-EEA cpty, (5) clearing obligation, (6) maturityyear, (7) eurnotional, (8) prev.notional, (9) prev.not.cleared.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	1.000	−0.025	0.027	−0.305	0.123	0.008	0.000	−0.068	−0.019
(2)	−0.025	1.000	−0.034	0.014	−0.082	0.016	0.000	0.047	0.008
(3)	0.027	−0.034	1.000	0.083	0.195	−0.039	0.000	0.013	−0.117
(4)	−0.305	0.014	0.083	1.000	0.054	−0.126	0.000	0.048	−0.047
(5)	0.123	−0.082	0.195	0.054	1.000	−0.366	0.000	0.033	−0.142
(6)	0.008	0.016	−0.039	−0.126	−0.366	1.000	0.000	0.041	−0.005
(7)	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000
(8)	−0.068	0.047	0.013	0.048	0.033	0.041	0.000	1.000	−0.005
(9)	−0.019	0.008	−0.117	−0.047	−0.142	−0.005	0.000	−0.005	1.000

Table 29: Pearson's correlation coefficients between dependent variables, for Foreign Exchange derivatives. Variables are: (1) intragroup, (2) financial nature, (3) tradingcapacity, (4) Non-EEA cpty, (5) clearing obligation, (6) maturityyear, (7) eurnotional, (8) prev.notional, (9) prev.not.cleared.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	1.000	−0.185	−0.084	−0.045	−0.080	−0.015	0.001	0.007	0.025
(2)	−0.185	1.000	−0.023	0.202	0.056	0.004	0.000	0.129	0.137
(3)	−0.084	−0.023	1.000	−0.077	0.243	−0.196	0.001	0.054	0.079
(4)	−0.045	0.202	−0.077	1.000	−0.007	−0.028	0.000	0.059	0.071
(5)	−0.080	0.056	0.243	−0.007	1.000	-0.182	0.001	0.103	0.125
(6)	−0.015	0.004	−0.196	−0.028	−0.182	1.000	0.000	0.082	0.017
(7)	0.001	0.000	0.001	0.000	0.001	0.000	1.000	0.000	0.000
(8)	0.007	0.129	0.054	0.059	0.103	0.082	0.000	1.000	0.951
(9)	0.025	0.137	0.079	0.071	0.125	0.017	0.000	0.951	1.000

Table 30: Pearson's correlation coefficients between dependent variables, for Interest Rate derivatives. Variables are: (1) intragroup, (2) financial nature, (3) tradingcapacity, (4) Non-EEA cpty, (5) clearing obligation, (6) maturityyear, (7) eurnotional, (8) prev.notional, (9) prev.not.cleared.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	1.000	−0.049	0.020	0.302	0.092	0.050	0.004	0.098	−0.162
(2)	−0.049	1.000	0.037	0.058	−0.035	−0.008	0.000	0.009	0.129
(3)	0.020	0.037	1.000	0.024	0.004	0.009	0.000	0.004	0.052
(4)	0.302	0.058	0.024	1.000	0.094	−0.004	0.002	0.036	0.086
(5)	0.092	−0.035	0.004	0.094	1.000	−0.044	0.001	0.051	−0.130
(6)	0.050	−0.008	0.009	−0.004	−0.044	1.000	0.000	0.027	−0.001
(7)	0.004	0.000	0.000	0.002	0.001	0.000	1.000	0.000	0.000
(8)	0.098	0.009	0.004	0.036	0.051	0.027	0.000	1.000	−0.007
(9)	−0.162	0.129	0.052	0.086	−0.130	−0.001	0.000	−0.007	1.000

Table 31: Robustness checks for fixed effects – Hypothesis 1 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
intragroup	−2.477***	−2.489***	−2.470***	−2.614***	−2.475***	−2.628***	−2.618***	−2.623***	−2.627***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.019)	(0.019)	(0.020)
Constant	−0.887***	−1.552***	−4.819	−1.132***	−6.107	−1.772***	−5.190	−6.449	−1.251***
	(0.001)	(0.009)	(14.620)	(0.005)	(23.387)	(0.010)	(14.328)	(22.897)	(0.023)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.117	0.122	0.139	0.143	0.144	0.148	0.166	0.170	0.152

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 32: Robustness checks for controls – Hypothesis 1 (Credit)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
intragroup	−2.614***	−2.677***	−2.696***	−2.492***	−2.654***	−2.613***	−2.620***	−2.689***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
log(eurnotional)		0.151***						0.141***
		(0.001)						(0.001)
maturityyear			−0.024***					−0.022***
			(0.000)					(0.000)
clearingobligation				−0.386***				−0.399***
				(0.003)				(0.003)
Non-EEA cpty					0.100***			0.130***
					(0.003)			(0.003)
tradingcapacity						−0.156***		−0.067**
						(0.022)		(0.022)
financial nature							1.025***	0.890***
							(0.019)	(0.019)
Constant	−1.132***	−3.375***	47.793***	−0.749***	−1.188***	−0.975***	−2.132***	42.171***
	(0.005)	(0.012)	(0.462)	(0.006)	(0.005)	(0.022)	(0.019)	(0.479)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.143	0.176	0.152	0.152	0.144	0.143	0.146	0.195

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 33: Robustness checks for fixed effects – Hypothesis 1 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
intragroup	-2.370^{***}	-2.348^{***}	-2.343^{***}	-2.382^{***}	-2.333^{***}	-2.359^{***}	-2.353^{***}	-2.344^{***}	-2.360^{***}
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Constant	0.162^{***}	0.145^{***}	0.601^{***}	0.150^{***}	0.769^{***}	0.144^{***}	0.541^{***}	0.706^{***}	0.147^{***}
	(0.001)	(0.002)	(0.157)	(0.002)	(0.157)	(0.003)	(0.157)	(0.157)	(0.006)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.154	0.163	0.165	0.158	0.169	0.167	0.169	0.173	0.167

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 34: Robustness checks for controls – Hypothesis 1 (Interest Rate)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
intragroup	−2.382***	−2.371***	−2.413***	−2.371***	−2.161***	−2.382***	−2.381***	−2.133***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
log(eurnotional)		0.022***						0.022***
		(0.000)						(0.000)
maturityyear			0.014***					0.015***
			(0.000)					(0.000)
clearingobligation				−0.090***				0.033***
				(0.002)				(0.002)
Non-EEA cpty					−1.203***			−1.204***
					(0.001)			(0.001)
tradingcapacity						0.056***		0.167***
						(0.014)		(0.014)
financial nature							0.687***	0.905***
							(0.007)	(0.007)
Constant	0.150***	−0.231***	−27.360***	0.237***	0.582***	0.094***	−0.532***	−30.310***
	(0.002)	(0.006)	(0.155)	(0.003)	(0.002)	(0.014)	(0.007)	(0.178)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.158	0.159	0.163	0.158	0.282	0.158	0.159	0.290

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 35: Robustness checks for fixed effects – Hypothesis 2 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
maturityyear	−0.004***	−0.004***	−0.006***	−0.005***	−0.006***	−0.005***	−0.007***	−0.007***	−0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	7.003***	7.202***	6.498	9.061***	5.619	9.249***	9.038	7.938	9.886***
	(0.337)	(0.340)	(14.630)	(0.344)	(14.627)	(0.347)	(14.500)	(23.180)	(0.349)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.000	0.007	0.031	0.013	0.037	0.019	0.044	0.049	0.024

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 36: Robustness checks for controls – Hypothesis 2 (Credit)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
maturityyear	−0.005***	−0.000***	−0.024***	−0.012***	−0.005***	−0.005***	−0.005***	−0.023***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)		0.137***						0.141***
		(0.001)						(0.001)
intragroup			−2.696***					−2.689***
			(0.020)					(0.020)
clearingobligation				−0.755***				−0.399***
				(0.003)				(0.003)
Non-EEA cpty					−0.239***			0.130***
					(0.002)			(0.003)
tradingcapacity						−0.399***		−0.067**
						(0.022)		(0.022)
financial nature							0.843***	0.890***
							(0.018)	(0.019)
Constant	9.061***	−1.933***	47.793***	24.385***	9.602***	9.468***	8.253***	42.171***
	(0.344)	(0.356)	(0.462)	(0.373)	(0.351)	(0.345)	(0.344)	(0.479)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.013	0.043	0.152	0.053	0.019	0.013	0.015	0.195

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 37: Robustness checks for fixed effects – Hypothesis 2 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
maturityyear	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−17.040***	−16.180***	−15.100***	−16.760***	−15.720***	−15.900***	−14.900***	−15.500***	−15.940***
	(0.138)	(0.139)	(0.210)	(0.138)	(0.211)	(0.139)	(0.211)	(0.211)	(0.140)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.003	0.018	0.024	0.006	0.032	0.021	0.027	0.035	0.022

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 38: Robustness checks for controls – Hypothesis 2 (Interest Rate)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
maturityyear	0.008***	0.013***	0.014***	0.008***	0.010***	0.008***	0.008***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)		0.056***						0.022***
		(0.000)						(0.000)
intragroup			−2.413***					−2.133***
			(0.004)					(0.004)
clearingobligation				−0.216***				0.033***
				(0.001)				(0.002)
Non-EEA cpty					−1.352***			−1.204***
					(0.001)			(0.001)
tradingcapacity						−0.188***		0.167***
						(0.014)		(0.014)
financial nature							0.774***	0.905***
							(0.006)	(0.007)
Constant	−16.760***	−26.580***	−27.360***	−16.040***	−19.890***	−16.590***	−17.720***	−30.310***
	(0.138)	(0.147)	(0.155)	(0.138)	(0.150)	(0.138)	(0.138)	(0.178)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.006	0.013	0.163	0.010	0.190	0.006	0.009	0.290

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 39: Robustness checks for fixed effects – Hypothesis 3 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(eurnotional)	0.137***	0.141***	0.140***	0.137***	0.141***	0.141***	0.140***	0.141***	0.141***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−3.185***	−3.823***	−6.896	−3.261***	−8.336	−3.876***	−7.042	−8.463	−3.455***
	(0.010)	(0.014)	(14.570)	(0.011)	(23.300)	(0.015)	(14.430)	(23.060)	(0.026)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.031	0.040	0.062	0.043	0.068	0.051	0.073	0.079	0.055

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 40: Robustness checks for controls – Hypothesis 3 (Credit)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(eurnotional)	0.137***	0.151***	0.137***	0.134***	0.137***	0.137***	0.136***	0.141***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
intragroup		−2.677***						−2.689***
		(0.020)						(0.020)
maturityyear			−0.001***					−0.023***
			(0.000)					(0.000)
clearingobligation				−0.710***				−0.399***
				(0.003)				(0.003)
Non-EEA cpty					−0.240***			0.130***
					(0.003)			(0.003)
tradingcapacity						−0.275***		−0.067**
						(0.022)		(0.022)
financial nature							0.744***	0.890***
							(0.019)	(0.019)
Constant	−3.261***	−3.375***	−1.933***	−2.511***	−3.121***	−2.984***	−3.973***	42.171***
	(0.011)	(0.012)	(0.356)	(0.012)	(0.011)	(0.025)	(0.022)	(0.479)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.043	0.176	0.043	0.079	0.049	0.043	0.044	0.195

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 41: Robustness checks for fixed effects – Hypothesis 3 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(eurnotional)	0.042***	0.048***	0.044***	0.041***	0.045***	0.047***	0.043***	0.044***	0.047***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−0.753***	−0.871***	−0.034	−0.711***	−0.079	−0.819***	−0.023	−0.076	−0.819***
	(0.004)	(0.005)	(0.157)	(0.005)	(0.157)	(0.005)	(0.157)	(0.157)	(0.007)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.004	0.021	0.026	0.008	0.034	0.024	0.030	0.038	0.025

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 42: Robustness checks for controls – Hypothesis 3 (Interest Rate)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(eurnotional)	0.041***	0.022***	0.056***	0.038***	0.022***	0.041***	0.040***	0.022***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
intragroup		−2.371***						−2.133***
		(0.004)						(0.004)
maturityyear			0.013***					0.015***
			(0.000)					(0.000)
clearingobligation				−0.204***				0.033***
				(0.001)				(0.002)
Non-EEA cpty					−1.339***			−1.204***
					(0.001)			(0.001)
tradingcapacity						−0.256***		0.167***
						(0.014)		(0.014)
financial nature							0.774***	0.905***
							(0.006)	(0.007)
Constant	−0.710***	−0.231***	−26.580***	−0.464***	0.126***	−0.458***	−1.436***	−30.310***
	(0.005)	(0.006)	(0.147)	(0.005)	(0.005)	(0.014)	(0.008)	(0.178)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.008	0.159	0.013	0.011	0.187	0.008	0.010	0.290

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 43: Robustness checks for fixed effects – Hypothesis 4 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Non-EEA cpty	−0.220***	−0.211***	−0.203***	−0.239***	−0.190***	−0.229***	−0.225***	−0.212***	−0.224***
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	−0.950***	−1.494***	−4.819	−1.071***	−5.950	−1.595***	−5.020	−6.327	−1.203***
	(0.002)	(0.009)	(14.620)	(0.005)	(14.623)	(0.010)	(14.483)	(23.155)	(0.023)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.006	0.011	0.035	0.018	0.040	0.024	0.048	0.053	0.028

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 44: Robustness checks for controls – Hypothesis 4 (Credit)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Non-EEA cpty	−0.239***	−0.240***	−0.239***	−0.202***	0.100***	−0.237***	−0.234***	0.130***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
log(eurnotional)		0.137***						0.141***
		(0.001)						(0.001)
maturityyear			−0.005***					−0.023***
			(0.000)					(0.000)
clearingobligation				−0.704***				−0.399***
				(0.003)				(0.003)
intragroup					−2.654***			−2.689***
					(0.020)			(0.020)
tradingcapacity						−0.291***		−0.067**
						(0.022)		(0.022)
financial nature							0.792***	0.890***
							(0.018)	(0.019)
Constant	−1.071***	−3.121***	9.602***	−0.392***	−1.188***	−0.782***	−1.849***	42.171***
	(0.005)	(0.011)	(0.351)	(0.006)	(0.005)	(0.022)	(0.019)	(0.479)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.018	0.049	0.019	0.054	0.144	0.018	0.020	0.195

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 45: Robustness checks for fixed effects – Hypothesis 4 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Non-EEA cpty	−1.349***	−1.418***	−1.450***	−1.347***	−1.465***	−1.415***	−1.446***	−1.461***	−1.417***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	0.514***	0.147***	0.667***	0.497***	0.426**	0.137***	0.642***	0.395*	0.124***
	(0.001)	(0.002)	(0.159)	(0.002)	(0.160)	(0.003)	(0.160)	(0.160)	(0.006)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.184	0.204	0.219	0.186	0.224	0.206	0.221	0.225	0.207

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 46: Robustness checks for controls – Hypothesis 4 (Interest Rate)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Non-EEA cpty	−1.347***	−1.339***	−1.352***	−1.340***	−1.203***	−1.347***	−1.362***	−1.204***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
log(eurnotional)		0.022***						0.022***
		(0.000)						(0.000)
maturityyear			0.010***					0.015***
			(0.000)					(0.000)
clearingobligation				−0.085***				0.033***
				(0.002)				(0.002)
intragroup					−2.161***			−2.133***
					(0.004)			(0.004)
tradingcapacity						0.155***		0.167***
						(0.014)		(0.014)
financial nature							1.089***	0.905***
							(0.006)	(0.007)
Constant	0.497***	0.126***	−19.890***	0.577***	0.582***	0.342***	−0.574***	−30.310***
	(0.002)	(0.005)	(0.150)	(0.003)	(0.002)	(0.014)	(0.007)	(0.178)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.186	0.187	0.190	0.187	0.282	0.186	0.192	0.290

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 47: Robustness checks for fixed effects – Hypothesis 5 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
financial nature	0.869***	1.158***	1.154***	0.842***	1.162***	1.128***	1.116***	1.125***	1.070***
	(0.018)	(0.019)	(0.021)	(0.018)	(0.021)	(0.019)	(0.021)	(0.021)	(0.020)
Constant	−1.959***	−2.723***	−5.973	−2.031***	−7.021	−2.768***	−6.102	−7.337	−2.329***
	(0.018)	(0.021)	(14.620)	(0.019)	(14.623)	(0.021)	(14.498)	(23.178)	(0.030)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.002	0.011	0.034	0.014	0.039	0.022	0.045	0.051	0.026

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 48: Robustness checks for controls – Hypothesis 5 (Credit)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Financial nature	1.128***	1.046***	1.131***	1.017***	1.016***	1.125***	1.109***	1.020***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)
log(eurnotional)		0.140***						0.146***
		(0.001)						(0.001)
maturityyear			−0.005***					−0.023***
			(0.000)					(0.000)
clearingobligation				−0.728***				−0.420***
				(0.003)				(0.003)
Non-EEA cpty					−0.212***			0.130***
					(0.003)			(0.003)
tradingcapacity						−0.169***		−0.050*
						(0.022)		(0.022)
intragroup							−2.626***	−2.694***
							(0.020)	(0.020)
Constant	−2.768***	−4.882***	8.312***	−2.035***	−2.594***	−2.597***	−2.862***	41.515***
	(0.021)	(0.024)	(0.348)	(0.021)	(0.021)	(0.031)	(0.022)	(0.479)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.022	0.054	0.023	0.061	0.027	0.022	0.151	0.203

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 49: Robustness checks for fixed effects – Hypothesis 5 (Interest Rate)

					cleared				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
financial nature	0.777***	0.970***	0.837***	0.764***	0.979***	0.958***	0.826***	0.968***	0.959***
	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Constant	−0.831***	−1.032***	−0.237	−0.784***	−0.388*	−0.975***	−0.220	−0.380*	−0.986***
	(0.006)	(0.007)	(0.157)	(0.007)	(0.157)	(0.007)	(0.157)	(0.157)	(0.009)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.003	0.019	0.025	0.006	0.033	0.022	0.028	0.037	0.023

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 50: Robustness checks for controls – Hypothesis 5 (Interest Rate)

	cleared							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
financial nature	0.958***	0.960***	0.969***	0.931***	1.071***	0.957***	0.746***	0.834***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
log(eurnotional)		0.047***						0.025***
		(0.000)						(0.000)
maturityyear			0.008***					0.013***
			(0.000)					(0.000)
clearingobligation				−0.215***				0.042***
				(0.001)				(0.002)
Non-EEA cpty					−1.421***			−1.234***
					(0.001)			(0.001)
tradingcapacity						0.026		0.240***
						(0.014)		(0.014)
intragroup							−2.353***	−2.071***
							(0.004)	(0.004)
Constant	−0.975***	−1.759***	−17.135***	−0.729***	−0.906***	−1.001***	−0.590***	−28.090***
	(0.007)	(0.009)	(0.140)	(0.007)	(0.007)	(0.016)	(0.008)	(0.180)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.022	0.028	0.025	0.026	0.211	0.022	0.168	0.299

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 51: Robustness checks for fixed effects – Hypothesis 6 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
previoustrades	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−0.782***	−1.534***	−4.819	−0.877***	−5.895	−1.614***	−5.024	−6.278	−1.216***
	(0.002)	(0.009)	(14.622)	(0.005)	(14.623)	(0.010)	(14.359)	(22.934)	(0.023)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.042	0.050	0.065	0.063	0.071	0.072	0.086	0.092	0.077

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 52: Robustness checks for controls – Hypothesis 6 (Credit)

					cleared				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
previoustrades	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	0.000***	−0.000***	−0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)		0.136***							0.141***
		(0.001)							(0.001)
maturityyear			−0.014***						−0.023***
			(0.000)						(0.000)
clearingobligation				−0.537***					−0.391***
				(0.003)					(0.003)
Non-EEA cpty					−0.030***				0.115***
					(0.003)				(0.003)
intragroup						−2.935***			−2.948***
						(0.020)			(0.021)
financial nature							1.197***		0.799***
							(0.019)		(0.019)
tradingcapacity								−0.123***	−0.114***
								(0.022)	(0.022)
Constant	−0.877***	−2.916***	26.615***	−0.388***	−0.863***	−1.264***	−2.029***	−0.755***	42.837***
	(0.005)	(0.011)	(0.400)	(0.006)	(0.005)	(0.005)	(0.019)	(0.022)	(0.477)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.063	0.093	0.067	0.083	0.063	0.145	0.068	0.063	0.197

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 53: Robustness checks for fixed effects – Hypothesis 6 (Interest Rate)

					cleared				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
previoustrades	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***	−0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.154***	−0.049***	0.601***	0.254***	0.661***	0.056***	0.681***	0.721***	−0.006
	(0.001)	(0.002)	(0.157)	(0.002)	(0.157)	(0.003)	(0.157)	(0.157)	(0.006)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.011	0.020	0.030	0.014	0.034	0.024	0.034	0.037	0.025

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 54: Robustness checks for controls – Hypothesis 6 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
previoustrades	−0.000***	−0.000***	−0.000***	−0.000***	0.000**	−0.000***	−0.000***	−0.000***	−0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)		0.044***							0.023***
		(0.000)							(0.000)
maturityyear			0.009***						0.015***
			(0.000)						(0.000)
clearingobligation				−0.244***					0.027***
				(0.001)					(0.002)
Non-EEA cpty					−1.348***				−1.198***
					(0.001)				(0.001)
intragroup						−2.359***			−2.136***
						(0.004)			(0.004)
financial nature							1.006***		0.926***
							(0.006)		(0.007)
tradingcapacity								0.040***	0.185***
								(0.014)	(0.014)
Constant	0.254***	−0.472***	−18.719***	0.504***	0.495***	0.312***	−0.713***	0.215***	−30.501***
	(0.002)	(0.005)	(0.139)	(0.003)	(0.003)	(0.003)	(0.007)	(0.014)	(0.179)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.014	0.019	0.017	0.019	0.186	0.161	0.019	0.014	0.290

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 55: Robustness checks for fixed effects – Hypothesis 6 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(prev.notional)	−0.025***	−0.022***	−0.023***	−0.028***	−0.015***	−0.028***	−0.028***	−0.022***	−0.028***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−0.463***	−1.064***	−4.530	−0.505***	−5.595	−1.033***	−4.653	−5.808	−0.611***
	(0.007)	(0.012)	(14.529)	(0.009)	(14.583)	(0.013)	(14.344)	(23.022)	(0.025)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.005	0.009	0.033	0.018	0.037	0.022	0.046	0.050	0.026

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 56: Robustness checks for controls – Hypothesis 6 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(prev.notional)	−0.028***	−0.032***	−0.029***	−0.018***	−0.023***	0.040***	−0.027***	−0.028***	0.027***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
log(eurnotional)		0.143***							0.143***
		(0.001)							(0.001)
maturityyear			−0.006***						−0.023***
			(0.000)						(0.000)
clearingobligation				−0.721***					−0.414***
				(0.003)					(0.003)
Non-EEA cpty					−0.208***				0.125***
					(0.003)				(0.003)
intragroup						−2.744***			−2.755***
						(0.020)			(0.020)
financial nature							1.117***		1.042***
							(0.019)		(0.020)
tradingcapacity								−0.194***	0.039*
								(0.022)	(0.023)
Constant	−1.033***	−3.190***	11.613***	−0.642***	−1.083***	−2.703***	−2.143***	−0.840***	41.198***
	(0.013)	(0.017)	(0.353)	(0.014)	(0.013)	(0.018)	(0.023)	(0.026)	(0.479)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.022	0.055	0.022	0.059	0.026	0.151	0.025	0.022	0.205

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 57: Robustness checks for fixed effects – Hypothesis 6 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(previousnotional)	−0.009***	0.015***	0.003***	−0.010***	0.021***	0.015***	0.002***	0.021***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.180***	−0.457***	0.560***	0.238***	0.203	−0.407***	0.574***	0.199	−0.429***
	(0.004)	(0.005)	(0.157)	(0.005)	(0.158)	(0.006)	(0.157)	(0.158)	(0.008)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.001	0.016	0.022	0.004	0.031	0.020	0.025	0.035	0.021

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 58: Robustness checks for controls – Hypothesis 6 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(prev.notional)	0.015***	0.012***	0.014***	0.015***	0.028***	0.042***	0.011***	0.015***	0.037***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)		0.046***							0.019***
		(0.000)							(0.000)
maturityyear			0.008***						0.013***
			(0.000)						(0.000)
clearingobligation				−0.220***					0.057***
				(0.001)					(0.002)
Non-EEA cpty					−1.425***				−1.236***
					(0.001)				(0.002)
intragroup						−2.412***			−2.083***
						(0.004)			(0.004)
financial nature							0.920***		0.726***
							(0.007)		(0.008)
tradingcapacity								−0.015	0.054***
								(0.014)	(0.015)
Constant	−0.407***	−1.100***	−16.140***	−0.181***	−0.575***	−0.922***	−1.227***	−0.393***	−28.180***
	(0.006)	(0.007)	(0.139)	(0.006)	(0.006)	(0.007)	(0.009)	(0.015)	(0.179)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.020	0.025	0.022	0.024	0.209	0.172	0.023	0.020	0.303

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 59: Robustness checks for fixed effects – Hypothesis 7 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
prev.tradescleared	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−1.406***	−1.598***	−4.819	−1.709***	−6.185	−1.886***	−5.253	−6.604	−1.330***
	(0.002)	(0.009)	(14.622)	(0.005)	(23.387)	(0.010)	(14.423)	(23.034)	(0.023)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.069	0.089	0.108	0.087	0.121	0.108	0.127	0.141	0.112

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 60: Robustness checks for controls – Hypothesis 7 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
prev.tradescleared	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)		0.157***							0.151***
		(0.001)							(0.001)
maturityyear			−0.015***						−0.025***
			(0.000)						(0.000)
clearingobligation				−0.490***					−0.272***
				(0.003)					(0.004)
Non-EEA cpty					−0.276***				0.038***
					(0.003)				(0.003)
intragroup						−2.408***			−2.483***
						(0.020)			(0.021)
financial nature							0.477***		0.595***
							(0.019)		(0.019)
tradingcapacity								−0.640***	−0.230***
								(0.022)	(0.022)
Constant	−1.709***	−4.115***	29.422***	−1.149***	−1.558***	−1.469***	−2.173***	−1.071***	46.670***
	(0.005)	(0.012)	(0.376)	(0.006)	(0.005)	(0.005)	(0.019)	(0.023)	(0.477)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.087	0.124	0.091	0.102	0.094	0.173	0.087	0.087	0.224

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 61: Robustness checks for fixed effects – Hypothesis 7 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
previoustradescleared	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−0.104***	−0.146***	0.601***	−0.083***	0.553***	−0.204***	0.569***	0.445***	−0.131***
	(0.001)	(0.002)	(0.157)	(0.002)	(0.157)	(0.003)	(0.157)	(0.157)	(0.006)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.000	0.023	0.023	0.004	0.037	0.027	0.027	0.041	0.028

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 62: Robustness checks for controls – Hypothesis 7 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
prev.tradescleared	0.000***	0.000***	0.000***	0.000***	0.000***	−0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)		0.040***							0.020***
		(0.000)							(0.000)
maturityyear			0.008***						0.014***
			(0.000)						(0.000)
clearingobligation				−0.216***					0.044***
				(0.001)					(0.002)
Non-EEA cpty					−1.375***				−1.214***
					(0.001)				(0.001)
intragroup						−2.385***			−2.119***
						(0.004)			(0.004)
financial nature							0.742***		0.859***
							(0.006)		(0.007)
tradingcapacity								−0.214***	0.125***
								(0.014)	(0.014)
Constant	−0.083***	−0.739***	−16.711***	0.145***	0.285***	0.183***	−0.793***	0.130***	−30.078***
	(0.002)	(0.005)	(0.138)	(0.003)	(0.003)	(0.003)	(0.007)	(0.014)	(0.178)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.004	0.008	0.007	0.008	0.191	0.158	0.006	0.004	0.290

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 63: Robustness checks for fixed effects – Hypothesis 7 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(prev.not.cleared)	0.066***	0.141***	0.141***	0.067***	0.164***	0.144***	0.142***	0.167***	0.147***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	−2.579***	−4.366***	−4.819	−2.712***	−7.993	−4.515***	−5.031	−8.223	−4.349***
	(0.010)	(0.017)	(14.622)	(0.011)	(23.387)	(0.018)	(14.503)	(23.186)	(0.030)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.038	0.099	0.104	0.050	0.127	0.110	0.114	0.138	0.114

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 64: Robustness checks for controls – Hypothesis 7 (Credit)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(prev.not.cleared)	0.144***	0.140***	0.147***	0.127***	0.141***	0.110***	0.146***	0.147***	0.107***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)
log(eurnotional)		0.133***							0.137***
		(0.001)							(0.001)
maturityyear			−0.010***						−0.025***
			(0.000)						(0.000)
clearingobligation				−0.641***					−0.345***
				(0.003)					(0.004)
Non-EEA cpty					−0.280***				0.053***
					(0.003)				(0.003)
intragroup						−2.564***			−2.620***
						(0.020)			(0.021)
financial nature							−0.465***		−0.075***
							(0.029)		(0.026)
tradingcapacity								−1.511***	−0.847***
								(0.029)	(0.026)
Constant	−4.515***	−6.538***	16.253***	−3.600***	−4.353***	−3.907***	−4.092***	−3.073***	46.667***
	(0.018)	(0.021)	(0.367)	(0.017)	(0.018)	(0.015)	(0.030)	(0.031)	(0.496)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047	1,814,047
McFadden's R^2	0.110	0.136	0.112	0.137	0.118	0.221	0.110	0.112	0.264
Notes:	***Significant at the 1 percent level.								
	**Significant at the 5 percent level.								
	*Significant at the 10 percent level.								

Table 65: Robustness checks for fixed effects – Hypothesis 7 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(prev.not.cleared)	0.032***	0.079***	0.062***	0.032***	0.103***	0.080***	0.063***	0.104***	0.080***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	−0.899***	−1.926***	−0.137	−0.884***	−1.862***	−1.923***	−0.161	−1.930***	−1.954***
	(0.003)	(0.005)	(0.163)	(0.004)	(0.176)	(0.005)	(0.165)	(0.178)	(0.008)
Monthly FE	No	No	No	Yes	No	Yes	Yes	Yes	No
Type FE	No	Yes	No	No	Yes	Yes	No	Yes	No
Country FE	No	No	Yes	No	Yes	No	Yes	Yes	No
Type-month FE	No	No	No	No	No	No	No	No	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.013	0.056	0.048	0.016	0.078	0.060	0.052	0.081	0.060

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Table 66: Robustness checks for controls – Hypothesis 7 (Interest Rate)

	cleared								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
log(prev.not.cleared)	0.080***	0.078***	0.080***	0.078***	0.088***	0.071***	0.079***	0.081***	0.079***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
log(eurnotional)		0.035***							0.009***
		(0.000)							(0.000)
maturityyear			0.008***						0.013***
			(0.000)						(0.000)
clearingobligation				−0.158***					0.104***
				(0.001)					(0.002)
Non-EEA cpty					−1.471***				−1.285***
					(0.001)				(0.002)
intragroup						−2.323***			−1.971***
						(0.004)			(0.004)
financial nature							0.232***		0.175***
							(0.008)		(0.009)
tradingcapacity								−0.554***	−0.320***
								(0.015)	(0.015)
Constant	−1.923***	−2.448***	−18.294***	−1.711***	−1.914***	−1.588***	−2.121***	−1.389***	−27.284***
	(0.005)	(0.007)	(0.142)	(0.006)	(0.006)	(0.006)	(0.009)	(0.016)	(0.182)
Monthly fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413	4,231,413
McFadden's R^2	0.060	0.063	0.062	0.062	0.256	0.194	0.060	0.060	0.330

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

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